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Public Perspectives on Nuclear Security US National Security Surveys, 1993-1997

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Public Perspectives on Nuclear Security

US National Security Surveys 1993–1997

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Abstract

This is the third report in a series of studies to examine how US attitudes about nuclear security are evolving in the post-Cold War era and to identify trends in public perceptions and preferences relevant to the evolution of US nuclear security policy. It presents findings from three surveys: a nationwide telephone survey of randomly selected members of the US general public; a written survey of randomly selected members of American Men and Women of Science; and a written survey of randomly selected state legislators from all fifty US states. The surveys were conducted between June and November 1997. They are comparative with each other and with previous surveys conducted in 1993 and 1995.

Key areas of investigation included nuclear security, cooperation between US and Russian scientists about nuclear issues, vulnerabilities of critical US infrastructures and responsibilities for their protection, and broad areas of US national science policy.

While international and US national security were seen to be slowly improving, the primary nuclear threat to the US was perceived to have shifted from Russia to China. Support was found for nuclear arms control measures, including mutual reductions in stockpiles. However, respondents were pessimistic about eliminating nuclear armaments, and nuclear deterrence continued to be highly valued. Participants favored decreasing funding for developing and testing new nuclear weapons, but supported increased investments in nuclear weapons infrastructure. Strong concerns were expressed about nuclear proliferation and the potential for nuclear terrorism. Support was evident for US scientific cooperation with Russia to strengthen security of Russian nuclear assets.

Elite and general public perceptions of external and domestic nuclear weapons risks and external and domestic nuclear weapons benefits were statistically significantly related to nuclear weapons policy options and investment preferences. Demographic variables and individual belief systems were systematically related both to risk and benefit perceptions and to policy and spending preferences.

Contents

Figures

Tables

Executive Summary

Chapter One: Introduction and Overview

This report summarizes the third phase in an ongoing series of studies to examine how US attitudes about nuclear security are evolving in the post-Cold War environment and to identify trends in public perceptions and preferences relevant to the evolution of US nuclear security policy. Groups surveyed in 1997 included the US general public, members of American Men and Women of Science, and state legislators from all 50 US states. The following table outlines the study series.

	PHASE I	PHASE II	PHASE III
COLLECTION PERIOD	June 1993–March 1994	September–November 1995	June–November 1997
RESPONDENT GROUPS	• General Public: *N = 1,301* *Rsp. Rate: 53.3%* • Union of Concerned Scientists: *N = 1,155* *Rsp. Rate: 55.3%* • US National Labs: *N = 1,226* *Rsp. Rate: 57.7%*	• General Public: *N = 2,490* *Rsp. Rate: 55.7%*	• General Public: *N = 1,639* *Rsp. Rate: 54.8%* • American Men and Women of Science: *N = 1,212* *Rsp. Rate: 53.8%* • State Legislators: *N = 603* *Rsp. Rate: 21.7%*
COLLECTION METHOD	• General Public: *Telephone* • Union of Concerned Scientists: *Mail* • US National Labs: *Mail*	• General Public: *Telephone*	• General Public: *Telephone* • American Men and Women of Science: *Mail* • State Legislators: *Mail*
KEY LINES OF INVESTIGATION	• Nuclear security • Philosophical approaches to science and research	• Nuclear security • US/Russian nuclear cooperation • Personal security	• Nuclear security • US/Russian nuclear cooperation • Critical infrastructures • Science policy

Chapter Two: Perceptions of Nuclear Weapons Risks

A majority of each of our three respondent groups in 1997 thought that US national security and international security had improved since the end of the Cold War. However, public perceptions of external nuclear risks to the US, measured in terms of the effect of the soviet breakup on the likelihood of nuclear war, nuclear proliferation, and nuclear terrorism, have not appreciably declined since our first measurements in 1993. Mean combined external nuclear risk perceptions were higher among the general public (6.3 on a scale where zero meant no risk, and ten meant extreme risk) than among either of two elite groups (scientists: 5.7; state legislators: 6.0). All three groups considered China to have replaced Russia as the primary nuclear threat to the US today and for the foreseeable future.

Perceptions of domestic nuclear risks associated with managing and controlling the US nuclear arsenal also were higher among respondents from the general public (5.1 on the same zero to ten scale) than among scientists (3.6) or state legislators (3.9). However, perceptions of domestic nuclear risk among the general public were significantly lower than those measured among the general public in 1993 (6.2).

Chapter Three: Perceptions of Nuclear Weapons Benefits

Respondents in 1997 continued to attribute substantial value to US nuclear weapons for purposes of US influence, international leadership, and national security. On a scale where zero meant not at all beneficial, and ten meant extremely beneficial, respondents from the general public rated combined external nuclear weapons benefits, on average, significantly higher than did respondents from American Men and Women of Science (6.5), and slightly lower (6.9) than did participating state legislators (7.1). All three groups indicated that they thought nuclear deterrence not only was important during the Cold War, but that it remained important today and for the foreseeable future. Public views of external nuclear benefits have remained relatively level since 1993.

As to domestic benefits, respondents thought that defense expenditures in general were important for jobs, the economy, and for technology transfers, but we were not able to isolate and differentiate those defense expenditures that were only for nuclear capabilities from those that were only for conventional capabilities. Using the same zero to ten scale, domestic benefits were rated at 6.6 by the general public group, 6.4 by participating state legislators, and 5.7 by the scientist group. Public assessments of domestic benefits have been steady since 1993.

Chapter Four: Policy and Spending Implications

Respondents from each of the three 1997 groups were supportive of mutual and verifiable reductions in nuclear weapons, but they were skeptical about the potential for completely eliminating all nuclear weapons. When asked to what minimum levels the US should consider reducing its nuclear arsenal in the context of mutual reductions with Russia, the median range suggested by participating scientists was 1,000–1,500 nuclear weapons, while the median range among participating state legislators was 2,500–3,000, and respondents from the general public suggested a median range of 1,500–2,000. A majority of each group considered it important to carefully consider Chinese as well as Russian nuclear capabilities in determining the extent to which the US should denuclearize.

Each of the groups in 1997 preferred reducing spending for developing and testing new nuclear weapons, but sizable support was reported for increasing funding for each of the following: (1) maintaining existing nuclear weapons in reliable condition; (2) improving the safety of existing nuclear weapons; (3) training those who manage nuclear weapons; and (4) maintaining nuclear weapons infrastructure. One of the most clear trends was among public views about investments in maintaining the ability to develop and improve nuclear weapons in the future. In 1993, two years after the end of the Cold War, only 38 percent supported increasing funding for nuclear weapons infrastructure; in 1995, 46 percent favored increasing such spending; and in 1997, six years into the post-Cold War era, a 53 percent majority recommended that investments to insure future nuclear weapons capabilities be increased.

As in previous years, very large majorities approaching unanimous consensus among all three groups thought that spending for preventing nuclear proliferation and nuclear terrorism should be increased.

All three 1997 groups also reported strong support for providing US technical assistance to help insure the following: (1) safeguarding Russian nuclear materials; (2) safely disposing of nuclear materials from disassembled Russian nuclear warheads; and (3) redirecting Russian nuclear weapons research to other areas. Less (but still substantial) support was reported for helping to fund efforts to achieve all three objectives. Support for such initiatives was stronger among the scientist group than among the other two respondent groups.

Nuclear weapons risk and benefit perceptions were statistically significantly related to nuclear security policy and spending issues among all three groups. Though such relationships were strongest among the scientists, we found ample evidence that multiple publics, including the lay public, made systematic connections between perceptions of external and domestic nuclear weapons risks and benefits and their implications for nuclear weapons policies and investment strategies. These findings reinforce those from each of our two previous studies, and they support the contention that Americans (with and without specialized nuclear expertise) are capable of contributing to public policy processes about the evolving nature of US nuclear security.

Chapter Five: Demographic Implications

As age increased among most groups, perceptions of nuclear weapons risks tended to decline, and perceptions of nuclear weapons benefits tended to increase, as did support for most policy options related to maintaining US nuclear weapons capabilities. However, age was not a strong predictor of preferences for most nuclear security policy and spending issues. Increasing age was positively and significantly related to perceived importance of retaining nuclear weapons and preferences for increasing investments in nuclear infrastructure.

Strong, consistent, and highly significant differences were found in each of our three studies regarding the ways in which women and men perceive the risks from our own nuclear weapons. Regardless of education, training, or other differences, women in each of our seven respondent groups since 1993 perceived significantly higher risks to be associated with the US nuclear arsenal than did men. Gender differences in perceptions of external nuclear risks from others' nuclear weapons and perceptions of benefits derived from US nuclear weapons were much smaller and less systematic. However, women were significantly more likely to consider the worldwide elimination of nuclear weapons to be feasible than were men, and women rated the importance of retaining nuclear weapons lower, on average, than did men.

Education, household income, and region of residence have not been strong predictors of nuclear weapons risk or benefit perceptions or of nuclear security policy and investment strategies in our three studies. Statistically significant relationships have been found among respondents from the general public, but they have not shown substantial explanatory powers. Generally, perceptions of nuclear weapons risks tended to increase slightly as formal education and household income increased among respondents from the general public. Among the same groups, perceptions of nuclear weapons benefits tended to decrease as education and income increased.

Considering all three studies in this series, perceptions of nuclear weapons risks and benefits have not differed significantly by region among elites. Some differences have been noted among respondents from the general public, but they have generally been weak and inconsistent. The only consistent trend has been for general public respondents from the South to rate the benefits of nuclear weapons somewhat higher than respondents from other regions.

Chapter Six: Belief Systems and Nuclear Security

We found multiple dimensions of belief systems to be importantly related to views about nuclear security.

Political Beliefs: Political ideology exhibited a strong and consistent relationship to nuclear weapons policy and spending issues among each of the seven groups surveyed since 1993. For all groups, as self-identified political conservatism increased, perceptions of nuclear weapons risks tended to decrease, and perceptions of nuclear weapons benefits tended to increase. Greater conservatism also was related to higher valuations of nuclear weapons capabilities and greater support for a variety of nuclear weapons policies and investments.

Social Beliefs: We created a social index reflecting a spectrum of social policy preferences ranging from more individualistic to more communitarian. As communitarian preferences increased, perceptions of nuclear risks tended to increase and perceptions of nuclear benefits tended to decrease. Support for arms control and concurrence with the premise that it is feasible to eliminate all nuclear weapons increased with communitarian beliefs, while support for investments in nuclear infrastructure increased with individualistic beliefs.

Economic Beliefs: As preferences for income redistribution increased, and as preferences for greater trade restrictions increased, perceptions of nuclear risks tended to increase. Perceptions of nuclear benefits tended to decrease with increasing preferences for income redistribution and to increase with preferences for trade restrictions.

Beliefs About Internationalism: As preferences for international political integration increased, perceptions of nuclear weapons risks tended to increase and perceptions of nuclear weapons benefits tended to decrease. Support for retaining US nuclear weapons and for investments in nuclear infrastructure decreased with stronger internationalist views. Support for fewer nuclear weapons and for nuclear arms control measures (fissile material cutoff and comprehensive test ban) increased with preferences for greater international integration.

Moral Beliefs: As concurrence increased with assertions that (1) the world would have been safer if nuclear weapons had never been invented, and (2) that the use of nuclear weapons can never be justified, agreement also increased with the premise that it is feasible to eliminate all nuclear weapons, while perceived importance of US nuclear weapons and support for nuclear weapons investments decreased.

Integration of Beliefs: We found that each of the individual dimensions of beliefs were correlated with one another, and that each was systematically related to the broader measure of political ideology.

Chapter Seven: Other Strategic Considerations

Critical Infrastructures: Eight critical US infrastructures were assessed in terms of the following: (1) sources of threats to critical infrastructures as a group; (2) specific vulnerabilities to terrorism; and (3) apportionment of responsibilities for protection.

All three respondent groups perceived US critical infrastructures to be vulnerable to foreign and domestic terrorism. Respondents from the general public perceived higher levels of vulnerability than did either elite group. Water supplies, telecommunications, electrical systems, and gas and oil supply systems were considered to be the most vulnerable. Transportation and banking and finance were rated as the next most vulnerable, and emergency services and continuity of government were ranked least at risk by all three groups.

The scientist and legislator groups were more willing to assign higher levels of responsibility for protecting critical infrastructures to private industry, while respondents from the general public assigned more responsibility to the federal government. Highest levels of responsibility at the local government level were assigned to protecting water supply systems. Highest levels of responsibility at the state government level were assigned for water supplies and transportation systems. For most infrastructures, the federal government and private industry received the highest apportionments, though no single assignment was much above 40 percent, which implied an expectation of integrated responsibilities for protective measures.

Science and Policy: Respondents evidenced substantial faith in science as the best source of reliable knowledge about the world, but legislator and general public groups reported considerable skepticism about scientific objectivity. Sixty-three percent of respondents from the general public and 47 percent of responding legislators agreed with the assertion that the same scientific evidence can be interpreted to fit opposing views; only 22 percent of the scientist group agreed with that statement. Fully 72 percent of the general public group, 56 percent of the legislator group, and 36 percent of the scientist group agreed that scientific research is almost always affected by the values held by researchers. Forty percent of respondents from the general public thought that technology has become dangerous and unmanageable, but both elite groups differed strongly with that assertion. Scientists working in colleges and universities and those working in national laboratories were more highly trusted to provide unbiased information about the risks and benefits of new technologies than were scientists working in business and industry.

In a series of specialized inquiries asked only of the two elite groups, scientists working in academic settings were considered by the scientist group to be best suited for accomplishing basic research, while the legislator group preferred the national laboratories. Both groups thought that scientists working in business and industry were best suited for conducting applied research and development as well as application and production. Both groups agreed that post-Cold War competition for federal funding is increasing among different sectors of science (academe, government supported research facilities, and private industry). The legislator group considered such competition to be beneficial, while the scientist group thought it was more harmful.

The scientist and legislator groups recommended apportioning federal investments in science as shown in the following table.

Apportioning Federal Investments (%)	Scientist Group	Legislator Group
Basic Research	49	39
Applied Research and Development	32	34
Application and Production	19	27

Chapter One

Introduction and Overview

THIS IS THE THIRD REPORT IN OUR ANALYSIS OF US ATTITUDES ABOUT post-Cold War security. Findings from this series of studies provide empirical data about the opinions of general and elite publics that are relevant to the debate about how US nuclear security policy should evolve in the 21st Century. As arguments for alternative policies are advanced, the views of military strategists and planners, nuclear weapons experts, policy specialists, government officials, and other active participants in strategic policy development will provide important impetus to the national debate. But views of the general public and elites who are not directly involved in national security processes also are important, for they provide the broader foundation and legitimacy on which long-range security policies must be constructed and sustained. However, because public views on strategic issues are more difficult to gauge and can be partially obscured by relatively small but vocal numbers of advocates, and because there are fewer avenues for their input, they can be difficult for policy makers to evaluate when considering complex strategic questions. The purpose of this research is to contribute to a better understanding of public views about nuclear weapons policies.

Section 1.1: Research Goals

OUR CONTINUING GOALS IN THIS RESEARCH SERIES ARE TO BETTER understand how US attitudes about nuclear security are evolving in the post-Cold War environment, and to identify trends in public perceptions and preferences relevant to the evolution of US nuclear security policy. To help meet these goals, we have sought answers to such key issues as how are public views of nuclear weapons, nuclear proliferation, and terrorism changing after the Cold War? Are strategic policy preferences systematically related to public views about the risks and benefits of nuclear weapons? If so, how are those perceptions and preferences evolving, and what are their implications for strategic policy? How do mass and elite views differ on issues of nuclear security? How do members of different publics perceive strategic relationships among Russia, China, and the US to be evolving? How is nuclear deterrence valued in light of post-Cold War security relationships? How are nuclear arms control issues perceived? What kinds of reductions in nuclear armaments do various American publics prefer? What degree of confidence do Americans place in science and technology to help provide security?

Ongoing Study Series

To better understand these and many related issues, we have conducted three national surveys of the US general public, different communities of scientists, and state legislators from all fifty states. Our first report analyzed results of a national survey conducted in late 1993 and early 1994 that included probability samples of the US general public, members of the Union of Concerned Scientists, and members of the technical staffs of four US national laboratories.[1] The main lines of investigation in that study were perceptions of US nuclear weapons, related strategic policy preferences, and philosophical approaches to science and research. Our second report presented results from a large sample of the US general public conducted in 1995.[2] In addition to being comparative to the nuclear weapons issues examined in the first study, it included additional sections on (1) nuclear proliferation and terrorism, (2) US/Russian scientific cooperation, and (3) issues of personal security. Our 1997 study included probability samples from the US general public, members of American Men and Women of Science, and state legislators from all fifty states. It's primary lines of investigation were as follows:

- Nuclear security (comparative to 1993 and 1995)
- US and Russian scientific cooperation (comparative to 1995)
- Critical infrastructure vulnerability and security
- Selected areas of national science policy

Table 1.1 characterizes each of the three related studies providing analyses of evolving perceptions and preferences.

Table 1.1 Survey Research Series on Post-Cold War Security

	PHASE I	PHASE II	PHASE III
COLLECTION PERIOD	June 1993–March 1994	September–November 1995	June–November 1997
RESPONDENT GROUPS	• General Public: *N = 1,301* *Rsp. Rate: 53.3%* • Union of Concerned Scientists: *N = 1,155* *Rsp. Rate: 55.3%* • US National Labs: *N = 1,226* *Rsp. Rate: 57.7%*	• General Public: *N = 2,490* *Rsp. Rate: 55.7%*	• General Public: *N = 1,639* *Rsp. Rate: 54.8%* • American Men and Women of Science: *N = 1,212* *Rsp. Rate: 53.8%* • State Legislators: *N = 603* *Rsp. Rate: 21.7%*
COLLECTION METHOD	• General Public: *Telephone* • Union of Concerned Scientists: *Mail* • US National Labs: *Mail*	• General Public: *Telephone*	• General Public: *Telephone* • American Men and Women of Science: *Mail* • State Legislators: *Mail*
KEY LINES OF INVESTIGATION	• Nuclear security • Philosophical approaches to science and research	• Nuclear security • US/Russian nuclear cooperation • Personal security	• Nuclear security • US/Russian nuclear cooperation • Critical infrastructures • Science policy

Section 1.2: Conceptual Approach

OUR 1997 STUDY WAS DESIGNED TO PROVIDE MULTIDIMENSIONAL comparability. First, it allowed perceptions from a national survey of the US general public to be compared with the views of two groups of policy elites: scientists and state legislators. Second, it provided comparisons between the two elite groups, one of which had extensive technical training and expertise, and one of which had responsibility for developing legislation at the state level. Third, because we continued key lines of investigation and used the same wording employed for selected questions in our two previous studies, results also allowed comparison of trends in general public perceptions, opinions, and preferences about nuclear security since 1993. Fourth, though less directly comparable because of temporal differences and separate group compositions, responses in 1997 from the broadly based American Men and Women of Science can be selectively contrasted with those of two groups of scientists who were previously surveyed because of their relevance to debate about nuclear security.[3] In some cases, we note the spectrum of views from scientists represented by the two earlier groups compared to those expressed in 1997 by members of the American Men and Women of Science.

Research Objectives

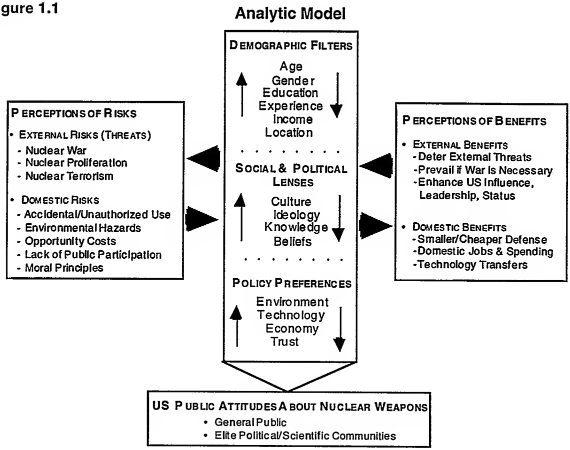
Specific objectives for the 1997 study included the following:

- Compare evolving mass and elite perceptions of external and domestic risks associated with nuclear weapons.
- Compare evolving mass and elite perceptions of external and domestic benefits associated with nuclear weapons.
- Compare trends in nuclear weapons policy preferences and spending priorities among mass and elite publics.
- Compare mass and elite perceptions of academic, industrial, and government sectors of science in the US.
- Measure public perceptions of the vulnerability of critical US infrastructures and how responsibility should be apportioned for protecting those infrastructures.
- Measure public attitudes about US and Russian scientific cooperation regarding nuclear security issues.

Analytic Model

Throughout this series of studies, we have been guided by an analytic framework within which we hypothesized key relationships expected to play a role in shaping opinions and preferences about nuclear weapons. From this framework, we initially drafted base line questions designed to measure key perceptions of risks and benefits associated with nuclear weapons and to examine their interaction with demographic filters, social and political lenses, and policy preferences. Questions about nuclear security were specifically designed to illuminate relationships among these sets of variables and to provide a core of continuity among all three studies. We have hypothesized, and research results indicate, that some key variables may be related as shown in Figure 1.1.

Figure 1.1



The analytic framework has important implications for the role of public opinion in security policy processes, because it hypothesizes that public attitudes about nuclear security policy result from a coherent (though informal) evaluation of risks and benefits perceived to be associated with nuclear weapons, and the relationships of those risks and benefits to associated policy options. The framework suggests that the evaluation of nuclear risks and benefits occurs within the context of a number of factors specific to each individual. Among them are the following sets of variables:

- Demographic factors such as age, gender, education, income, training, experience, and place of residence

- Social and political lenses shaped by political culture and ideology, subject knowledge, and general belief systems

- Preferences about related public policy issues such as the environment, the role of technology in society, economic considerations, and trust in public institutions and processes

Public's Role

Because our analytic framework does not postulate that basic policy evaluation processes differ conceptually among different publics, we hypothesize that members of the general public not having technical training or policy making expertise reach judgments about nuclear security issues in much the same fashion as do members of elite groups such as scientists and legislators, though results may be significantly different. Comparing the ways in which mass and elite groups relate risk and benefit perceptions to preferences about security policy options is among our key objectives in this study series. If repeated findings over time are consistent with underlying assumptions of the framework, the evidence would support greater involvement and participation by various publics in evolving nuclear security policies.

Guided Discussions

Focus groups and structured interviews allow guided discussions among members of populations to be surveyed, and they promote the exchange of ideas between group members and researchers about issues central to a study and its analysis. These kinds of discussions help researchers gain insights about how key variables are perceived and how they may be related to public understanding. They provide qualitative inputs that can inform the design and construction of survey instruments, and they provide a series of anecdotal impressions that can help researchers anticipate patterns of survey responses.

To assist in the development of survey instruments for this study, we conducted three forms of preliminary discussions.

- *General Public:* On March 13, 1997 we conducted a focus group of seven members of the general public between the ages of 18 and 65 in Albuquerque, New Mexico.

- *Scientists:* On February 16, 1997, we held a focus group discussion with nine scientists who were attending the 1997 annual convention of the American Association for the Advancement of Science in Seattle, Washington.

- *State Legislators:* Because of the logistical difficulties of organizing a focus group discussion among legislators from different states, we conducted individual interviews by telephone in March and April, 1997, with five upper chamber and five lower chamber state legislators from ten different states.

Results were used to tailor major lines of inquiries about subjects not previously addressed in our 1993 or 1995 surveys and to help prioritize those issues selected from earlier studies for comparisons over time.

Section 1.3: Sampling

Rigorous probability sampling methods were applied as described below, yielding an approximate sampling error of plus or minus three percent for the scientist and general public samples and approximately plus or minus four percent for the legislator sample.

Sampling the General Public

A sample frame of randomly selected and randomly ordered households having one or more telephones was purchased from Survey Sampling, Incorporated, of Fairfield, Connecticut. The sample frame was loaded into a computer assisted telephone interviewing system which selected and dialed the individual numbers. Each household had an equal chance of being called. Probability sampling was extended within each household by interviewing only the member of the household over the age of 18 with the most recent birthday. Up to ten attempts were made to contact the individual selected for the sample. No substitutions were made.

Figure 1.2 shows the geographical distribution of individual participants from the general public. Table 1.2 compares key demographics of survey participants from the general public to national and regional population parameters to illustrate the representativeness of survey respondents compared to their parent populations.

Figure 1.2 Geographic Distribution of General Public Respondents

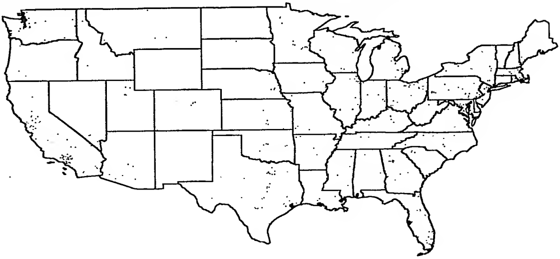


Table 1.2 Demographic Representativeness of General Public Respondents

Demographic Category	US National Population (%)	Survey Respondents (%)
Gender [4]		
Males	48.2	45.4
Females	51.8	54.6
Age [5]		
18–24	12.7 [6]	11.7
25–54	59.1 [7]	62.7
> 54	28.2 [8]	25.6
Education [9]		
H.S. Graduate or Higher	81.1	92.7
College Grad. or Higher	21.5	33.5
Race / Ethnicity [10]		
White, non-Hispanic	72.7	80.9
Black	12.7	6.4
Hispanic (any race)	10.9	4.0
American Indian	0.9	2.2
Asian	3.8	1.3
Other	N/A	5.1
Household Income [11]		
$0–49,999	65.7	59.6
$50,000–99,999	26.1	32.3
$100,000 and above	8.2	8.2
Region [12]		
Northeast [13]	19.3	19.8
Midwest [14]	23.3	23.9
South [15]	35.2	33.5
West [16]	22.2	22.8

Sampling Scientists

Participants to be surveyed were randomly chosen from among 123,406 scientists and engineers whose names were published in *American Men and Women of Science, 1995–1996.*[17] Members of this organization were selected based on the following criteria:[18]

- *Specialty Criteria:* Living scientists in the physical and biological fields, as well as public health scientists, engineers, mathematicians, statisticians, and computer scientists.

- *Achievement Criteria:* Distinguished achievement by reason of (1) experience, training, or accomplishments, including contributions to literature, coupled with continuing activity in scientific work; or (2) research activity of high quality in science, as evidenced by publication in reputable scientific journals, or, for those whose work cannot be published due to government or industrial security, research of high quality in science as evidenced by the judgment of the individual's peers; or (3) attainment of a position of substantial responsibility requiring scientific training and experience.

A sample frame of 7,000 names was purchased from Cahners Direct Marketing Services in New York.[19] The final sample was constructed using a random number generator, and was stratified in proportion to the percentage of members classified in each of nine major scientific disciplines specified by the publisher, and a tenth category identified by the publisher as "other professional fields." Because only approximately seven percent of the overall membership of American Men and Women of Science were women, we added an oversample of 200 identifiable female names to insure a large enough number of women scientists for comparative analyses based on gender. Table 1.3 shows percentages of the population, sample, and respondents from each of the ten major categories incorporated in *American Men and Women of Science, 1994–1996.*

Table 1.3 American Men and Women of Science Categories

Classification [20]	% of AMWS Membership	% of Survey Respondents
Agricultural & Forest Sciences	3.2	4.3
Biological Sciences	25.8	23.6
Chemistry	14.7	17.5
Computer Sciences	3.2	3.3
Engineering	15.1	15.4
Environmental, Earth & Marine Sciences	6.2	7.3
Mathematics	5.1	4.7
Medical & Health Sciences	12.2	9.4
Physics & Astronomy	10.0	9.2
Other Professional Fields	4.5	5.4
Region [21]		
Northeast [22]	23.9	21.6
Midwest [23]	20.0	21.6
South [24]	29.7	32.9
West [25]	20.6	22.4
Outside US	4.1	0.0

Sampling State Legislators

Legislators to be surveyed were systematically selected from the total population of 7,424 state legislators listed in the *State Leadership Directory: Directory 1–Elective Officials 1997,* published by the Council of State Governments, Lexington, Kentucky. The sample was stratified in three ways. The number of legislators sampled from each of the 50 states was proportional to the number of each state's electoral votes divided by the total size of the electoral college (535). The number of legislators surveyed from upper and lower chambers of state legislatures was proportional to each state's division of membership between the two houses.[26] The approximate percentage of men and women members of each chamber of each legislature was calculated based on gender specific names. Those percentages were then used to select samples from each chamber that were approximately proportional to gender. Table 1.4 compares the total population of 7,424 state legislators to respondents in terms of gender (estimated from first names), upper and lower legislative chamber, political party, and census region.

Table 1.4 State Legislators by Category

	All State Legislators [27] (%)	Respondents (%)
Gender [28]		
Females	20.7	24.2
Males	79.3	75.8
Chamber		
Senate	26.1	25.3
House	73.9	74.7
Party		
Democrat	52.1	45.2
Republican	47.0	53.3
Independent/Other	0.9	1.5
Region [29]		
Northeast [30]	25.7	17.8
Midwest [31]	23.6	30.8
South [32]	33.1	29.8
West [33]	17.6	21.5

As shown in Table 1.4, a larger proportion of women responded than did men. The distribution of respondents between upper and lower legislative chambers closely matched the overall population of state legislators. Somewhat higher proportions of Republicans responded than did Democrats. Relatively fewer participants from the Northeast and South responded, and somewhat larger proportions of legislators from the Midwest and West chose to participate.

Section 1.4: Data Collection

General Public

A NATIONWIDE TELEPHONE SURVEY WAS ADMINISTERED BY THE University of New Mexico's Institute for Public Policy (IPP) between September 15 and November 2, 1997. The interviews were conducted in the IPP Survey Research Center by highly trained interviewers using a computer assisted telephone interviewing system that recorded data in a centralized collection file. Rigorous supervision and quality control measures were applied throughout the data collection process. The response rate for the general public was 54.8 percent.

American Men and Women of Science

A mail survey was conducted using a modified total design concept with repeated wave mailings. The following components were mailed as indicated.

- An initial contact letter describing the research project and requesting participation was mailed to each member of the sample on May 23, 1997.

- A follow-up letter accompanying the printed survey booklet was mailed to each member of the sample on May 30, 1997.

- A first reminder card was mailed to those members of the sample whose response had not been received by June 12, 1997.

- A second survey booklet and accompanying letter was mailed to those members of the sample whose response was not received by June 27, 1997.

- A second reminder card was mailed to those members of the sample whose response was not received by July 16, 1997.

The number of days from the date the initial contact letter was mailed to the date a completed survey booklet was received (a period known as lag) was recorded for each participant. The average lag was 38 days. The overall response rate for scientists was 53.8 percent.

Data from completed survey booklets was manually entered into a master collection file. After the data entry, two person quality control teams were used to verify all data from each questionnaire.

State Legislators

A mail survey was conducted using the same modified total design concept and repeated wave mailings described above. The following components of the legislator survey were mailed on the dates indicated.

- Initial contact letter: June 3, 1997

- First survey questionnaire (with letter): June 9, 1997

- First reminder card: June 23, 1997

- Second survey questionnaire (with letter): July 14, 1997

- Second reminder card: July 30, 1997

Our telephone interviews with individual state legislators during the design stage of the project alerted us to the difficulty of persuading their colleagues to participate in surveys. Most of those who consented to be interviewed in the design stage indicated that if they had received a written survey on national and international security issues, they would have been very unlikely to participate. State legislators are a particularly difficult group to survey for several reasons. They are busy people who often have businesses or jobs in addition to their legislative duties. They are bombarded with questionnaires, requests for interviews, access by lobbyists, requests for constituent services, and many other demands for their time and attention. Some are reluctant to share their views on controversial topics with persons from outside their legislative districts, and others are wary of being used for partisan objectives or political causes. Some fear their responses will be used against them, because during campaigns opponents may demand public release of responses to confidential surveys. Some are unwilling to comment on issues such as nuclear security for which they do not normally have direct legislative responsibilities. Some state legislators have a policy of not responding to any surveys; others use their staff to filter out most survey requests. For these and other reasons, we anticipated participation levels below those achieved with other populations, and at 21.7 percent, our overall response rate with state legislators was less than half that achieved with members of American Men and Women of Science or with members of the general public.

Challenges of Surveying Legislators

The potential for response bias varies inversely with response rate, and at lower levels of response, the implications of self-selection by those who choose to participate must be considered. In such situations, two key issues should be investigated. First, do nonrespondents and respondents differ in terms of individual characteristics? Second, what are the implications (if any) of such differences for the issues being investigated? When these questions have been addressed, users of the survey data are better prepared to interpret the operational relevance of responses.

Potential for Response Bias

To help answer these questions, we conducted a follow-up telephone survey of 210 randomly selected legislators who had not responded to the written survey. Highly experienced interviewers were selected and trained to administer either of two survey options. The first objective was to reach the selected legislator by phone and complete an abbreviated survey instrument that included a series of legislative profile questions and a short series of issue questions. For those legislators that we were unable to reach or that refused to participate by phone, our second objective was to get the following series of "legislative profile" questions answered by a member of the legislator's staff.

- Years as a state legislator, including service in both chambers
- Number of legislative committees on which the legislator was currently serving
- Number of bills sponsored by the legislator in the last session
- Number of full or part-time staff members
- Percent of professional time spent on legislative matters during the past year
- Legislative leadership positions currently held

Profile information such as political party, legislative chamber, whether elected to a first term or reelected, and length of legislative session was available for all state legislators from the Council on State Governments.

As a result of these intensive follow-up efforts, we were able to acquire legislative profile information on 139 legislators who were nonrespondents to the mail survey, and we were able to personally interview and acquire data on issue preferences from 62 of those legislators. This yielded a 66 percent overall response rate for the telephone sample of nonrespondents to the mail survey.

Results allow comparisons of participants and nonparticipants in several dimensions. Table 1.5 compares legislative demographics that are available for all state legislators with those of the survey participants. Table 1.6 compares legislative profile data gathered from mail survey participants to information gained in telephone interviews with mail survey nonrespondents or knowledgeable members of their staffs.

Table 1.5 Legislator Demographic Comparisons (General)

Demographic Category	Full Sample %	Mail Respondents %	Phone Respondents %	All Mail Non-respondents %
Democrat	51	46	53	53
Republican	48	53	46	46
Independent	<1	<1	<1	<1
Other	<1	2	<1	<1
Women (est.)	20	25	23	20
Men (est.)	80	75	77	80
House	73	72	75	73
Senate	27	27	25	27
First Term	14	19	9	13
Reelected	84	80	89	86
House to Senate	1	1	2	1
Session > 9 mos.	22	17	26	23
Session < 9 mos.	78	83	74	77

Table 1.6 Legislator Demographic Comparisons from Survey Responses

	Means		
Demographic Category	Mail Resp.	Phone Resp.	Difference
Years as state legislator (both chambers)	7.5	9.2	+1.5
Number of committees of whch legislator is a member	3.9	4.3	+0.4
Number of bills sponsored in previous session	32.6	43.4	+10.8
Number of full-time or part-time staff members	2.5	4.1	+1.6
Percent of professional time spent on legislative matters during past year			
< 25 %	6	4	− 2
25–50 %	27	23	− 4
50–75 %	38	25	−13
75–100 %	29	48	+19
Percent holding legislative leadership position(s)	42	31	−11

Legislator Respondents vs. Nonrespondents

Compared to those who declined to participate in the mail survey, respondents to the printed survey included disproportionate numbers of Republicans (+7%), females (+5%), those serving in their first elected term of office (+6%), and members of legislatures that meet for fewer than nine months per year (+7%). Compared to those who participated in the telephone survey (*non*respondents to the mail survey), participants in the mail survey, on average, served fewer years as a legislator (–1.5), sat on fewer legislative committees (–0.4), sponsored or co-sponsored fewer bills during the past legislative session (–10.8), received the services of fewer staff personnel (–1.6), were more likely to have held one or more legislative leadership positions (+11 %), and reported spending more time during the past year on legislative matters (including constituent services).

Turning to perceptions and policy issues, Table 1.7 compares the views of mail respondents to those of 62 legislators who did not respond to the mail survey, but agreed to personally participate in a short telephone follow-up. The abbreviation "n. s." indicates that the difference in means between respondents to the mail survey and nonrespondents to the mail survey who consented to follow-up telephone interviews was not statistically significant at the .05 level of confidence.

Table 1.7 Comparing Views of Legislator Respondents and Nonrespondents

Issue	Mail Resp. (means)	Phone Resp. (means)	p Value
1-1: How has international security changed since the end of the Cold War [1 = Much Less Secure — 7 = Much More Secure]	4.5	4.8	n.s.
1-6: Risk of transporting nuclear weapons in the US [0 = No Risk — 10 = Extreme Risk]	4.5	5.2	.0389
1-17: Importance of US nuclear weapons for US status as world leader [0 = Not At All Important — 10 = Extremely Important]	6.7	7.1	n.s.
1-21: Importance of US nuclear weapons for deterrence today [0 = Not At All Important — 10 = Extremely Important]	7.6	7.0	.0386
1-23: Lowest acceptable level of US nuclear weapons [1 = 7,000 to 6,500 decreasing in increments of 500 to 15 = 0]	8.9	7.7	n.s.
2-51: How should federal spending change for domestic vs. international issues [1 = Greater Domestic Emphasis — 7 = Greater International Emphasis]	3.6	2.8	.0152
3-19: Political ideology [1 = Strongly Liberal — 7 = Strongly Conservative]	4.8	4.8	n.s.

On these selected issues, views among respondents to the mail survey differed significantly in only three cases from those of nonrespondents who agreed to a telephone follow-up interview. Nonrespondents to the mail survey perceived significantly more risk to be associated with transporting nuclear weapons in the US (1-6), assigned significantly less importance to the role of nuclear weapons in providing deterrence today (1-21), and were significantly more inclined to reallocate federal investments from international issues to domestic spending (2-51). While these differences are based on an insufficient number of completed follow-up interviews (62) to warrant formal weighting of the views from mail survey respondents, the combination of demographic differences and substantive issue preferences yield directional insights that can be useful when assigning operational relevance to the views of those legislators who participated in the mail survey.[34]

What are the implications of such response bias for interpreting the results of the legislator survey? First, it is important to keep in mind that respondents to the mail survey were less senior than their nonrespondent colleagues. Second, respondents were more likely to be Republican and/or women. And finally, they tended to be less concerned about the domestic risks of the US nuclear stockpile, and may have been more likely to see benefits from retaining nuclear weapons. Thus in evaluating the distribution of answers provided by those legislators who responded to the mail survey, it is important to remember the *direction* of the likely response bias. We will remind the reader of the need for this correction where appropriate.

Section 1.5: Data Analysis

In the chapters that follow, we employ four broad types of analyses.

- *Descriptive Analyses:* Frequency distributions and central tendencies for all questions in the 1997 surveys and for those questions from the 1993 and 1995 surveys that were used for comparisons are provided in Appendix One and are discussed in detail in the report. We employed both pictorial and textual methods to describe the data, with an emphasis on graphics to more efficiently provide complex descriptions.

- *Relational Analysis:* Standard statistical techniques such as analysis of variance, correlations, factor analyses, and ordinary least squares regressions were used to investigate relationships among individual and grouped variables. Since 1993, we have sought to identify and measure many of the important variables influencing public preferences about strategic policy and spending. Using combinations of independent variables, we were able to predict substantial portions of the variation in key dependent variable policy and spending preferences.

- *Trend Analyses:* By comparing key questions first asked in 1993 and repeated in 1995 and 1997, we were able to assess trends in the evolution of US perceptions and policy preferences relating to national and international security in the post-Cold War era. Over time analyses are provided for responses by members of the general public to those questions used in multiple surveys.

- *Spatial Analyses:* Geographical characteristics have been analyzed for selected variables to determine if spatial relationships helped explain variations. Graphic display of spatial relationships has also been employed.

Section 1.6: Report Organization

Chapter Two

In Chapter Two, "Perceptions of Nuclear Weapons Risks," we provide results of questions inquiring about perceptions of risks associated with nuclear conflict, nuclear proliferation, and nuclear terrorism, and we combine results into an index of *external* nuclear weapons risk perceptions. We also present results from questions designed to measure perceived risks associated with manufacturing, transporting, storing, and disassembling nuclear weapons in the US, as well as the risks associated with storing radioactive materials in the US from disassembled weapons, and the perceived likelihood of accidental or unauthorized use of a US nuclear weapon. We then group those results into an index of *domestic* nuclear weapons risk perceptions. The external and domestic nuclear risk indices are then combined to form a composite nuclear weapons risk index. Trend analysis is accomplished by comparing answers from the general public group in 1997 to those provided by respondent groups from the general public in 1995 and 1993.

In Chapter Three, "Perceptions of Nuclear Weapons Benefits," we present results of inquiries about perceptions of the utility of US nuclear weapons for achieving national security objectives that are grouped into an index of *external* nuclear weapons benefits. We also discuss the degree to which respondents perceive US nuclear weapons to be useful for allowing smaller defense investments than would be necessary in their absence, and we present responses to questions about the perceived value of defense industry jobs and technology transfers from the defense sector to other sectors of the US economy. Results are aggregated to form a *domestic* nuclear weapons benefit index. The external and domestic nuclear benefits indices are also combined to form a composite nuclear weapons benefit index. As in the preceding chapter, trends in public perceptions of external and domestic benefits associated with US nuclear weapons are analyzed by comparing results from the 1997 survey to those measured in 1993 and 1995.

Chapter Three

In Chapter Four, "Policy and Spending," we examine elite and general public preferences about policies related to nuclear weapons research, arms control, nonproliferation, preventing terrorism, and US–Russian nuclear cooperation. We also report preferences about denuclearization and minimum acceptable levels of US nuclear armaments, as well as perspectives about the potential for eliminating all nuclear weapons. Additionally, we describe public preferences for investments in nuclear weapons infrastructure, stockpile stewardship, and efforts to prevent nuclear proliferation and terrorism. Finally, in this chapter we examine the degree to which each of the four risk and benefit indices developed in Chapters Two and Three are systematically related to specific policy options and spending preferences. Where applicable, we compare data about the general public reported in 1997 with those data previously reported in our previous studies.

Chapter Four

In Chapter Five, "Demographic Implications," we describe each of our respondent groups in terms of age, gender, education, income, and geographic region. We analyze the relationships found between demographic characteristics, nuclear risk and benefit perceptions, and nuclear weapons policy and spending preferences.

Chapter Five

In Chapter Six, "Belief Systems and Nuclear Security," we examine different dimensions of individual belief systems and their relationships to selected policy and spending choices. Specifically, we relate beliefs about political, social, economic, and moral concepts, to views about nuclear security. Also we investigate views about the international community and how states should interact politically, socially, and economically, and we look at how views about nature and the environment may be related to perceptions of nuclear weapons risks and benefits as well as policy and spending options.

Chapter Six

Chapter Seven

Chapter Seven, "Other Strategic Considerations," reports perceptions of the vulnerabilities of critical US infrastructures and how responsibility for protecting critical infrastructures should be apportioned among federal, state, and local levels of government and the private sector. We also examine perceptions about the role of technology in society and the suitability of key sectors of science for accomplishing research, development, and production.

Appendix

The Appendix contains a comprehensive listing of questions from the three 1997 surveys, along with frequency distributions and means. We also provide comparative frequency distributions and means for those questions that were previously asked in 1995 and 1993.

End Notes

[1] Hank C. Jenkins-Smith, Richard P. Barke, and Kerry G. Herron. 1994. *Public Perspectives of Nuclear Weapons in the Post-Cold War Environment: Findings and Analysis of the National Security Survey: Perceptions and Policy Concerns 1993–1994.* Document ID: SAND94-1265. Albuquerque, NM: Sandia National Laboratories.

[2] Kerry G. Herron and Hank C. Jenkins-Smith. 1996. *Evolving Perceptions of Security: US National Security Surveys 1993–1995.* Document ID: SAND96-1173. Albuquerque, NM: Sandia National Laboratories.

[3] For the 1993 study we randomly selected members of the Scientists' Action Network of the Union of Concerned Scientists to represent views of technically trained persons who (on the basis of group membership) were expected to understand nuclear weapons technology from a relatively critical or negative perspective. Randomly selected members from the technical staffs of Los Alamos National Laboratory, Sandia National Laboratories, Pacific Northwest National Laboratory, and Lawrence Berkeley National Laboratory were chosen (on the basis of place of employment) to represent the views of technically trained persons who were likely to understand nuclear weapons technology from a relatively supportive or positive perspective.

[4] U.S. Bureau of the Census, Population Division. 1997. Release PPL-57, *United States Population Estimates, by Age, Sex, Race, and Hispanic Origin, 1990 to 1996* (with associated updated tables for recent months). Washington, DC: U.S. Government Printing Office.

[5] *Ibid.*

[6] The portion of the total US population that is 18–24 years of age is 9.3 percent. Of all those 18 years of age or older, 12.6 percent are 18–24 years of age. The latter number is used for comparison with our respondents, because by design we excluded individuals below the age of 18 from our survey.

[7] The portion of the total US population that is 25–54 years of age is 43.8 percent. Of all those 18 years of age and older, 59.2 percent are 25–54 years of age. The latter number is used for comparison with our respondents, because by design we excluded individuals below the age of 18.

[8] The portion of the total US population that is over 54 years of age is 20.9 percent. Of all those 18 years of age and older, 28.2 percent are over the age of 54. The latter number is used for comparison with our respondents, because by design we excluded individuals below the age of 18.

[9] U.S. Bureau of the Census, Population Division. 1996. *Current Population Reports: Educational Attainment in the United States: March, 1996.* Washington, DC: U.S. Government Printing Office.

[10] U.S. Bureau of the Census, Population Division. 1997. Release PPL-57, *United States Population Estimates, by Age, Sex, Race, and Hispanic Origin, 1990 to 1996* (with associated updated tables for recent months). Washington, DC: U.S. Government Printing Office.

[11] U.S. Bureau of the Census. 1997. *Current Population Reports, P60-197: Money Income in the United States: 1996 (With Separate Data on Valuation of Noncash Benefits). Washington*, DC: U.S. Government Printing Office.

[12] Alaska, Hawaii, Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, Puerto Rico, Midway Islands, and the Virgin Islands were not included in the sample frame from which participants for the general public survey were randomly chosen. Alaska, Hawaii, and US Territories were included in the sample frames for American Men and Women of Science. Alaska and Hawaii were also included in the sample of state legislators.

[13] States included in the Northeast region included Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

[14] States included in the Midwest region included Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

[15] States included in the South region included Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

[16] States included in the West region included Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

[17] Peter E. Simon et al. 1997. *American Men and Women of Science: 1995–1996*, 19th ed. New Providence, NJ: R. R. Bowker.

[18] *Ibid.* p. vii.

[19] After the sample frame was purchased, Cahners Direct Marketing Services became Reed Elsevier Business Lists, 249 West 17th Street, New York, NY 10011.

[20] Classification of specialty was self-identified in accordance with the National Science Foundation's Taxonomy of Degree and Employment Specialties. Entrants were classified into 191 subject specialties listed in the table of contents of *American Men and Women of Science: 1995–1996, Volume 8.* Specialties were grouped by the publisher into the ten general classifications shown in Table 1.3.

[21] Members of American Men and Women of Science are classified by the publisher into 15 geographical categories. For purposes of consistency with other samples, we reorganized those categories into the four regions previously used for comparing representativeness of the general public sample, plus the category "Outside the US" for those members who reside outside the 50 US states.

[22] See note 13.

[23] See note 14.

[24] See note 15.

[25] See note 16.

[26] The one exception was Nebraska, which has a unicameral legislature.

[27] At the time the *State Leadership Directory: Directory 1–Elective Officials 1997* was printed, eight upper and five lower chamber seats were unfilled.

[28] Data on the gender of all state legislators were not available from the Council of State Governments. Gender distinctions were estimated based on gender specific first names. For first names that were not gender specific, consistent categorization was used for each variation of each nonspecific name.

[29] States were grouped into the same four census regions previously used for comparing geographic representativeness of the general public and scientist samples.

[30] See note 13.

[31] See note 14.

[32] See note 15.

[33] See note 16.

[34] We compared selected characteristics of (1) nonrespondents to the mail survey who personally answered or whose staff answered by telephone the legislator profile questions, (2) nonrespondents to the mail survey who personally answered the profile questions and a limited number of issue questions by phone, and (3) all nonrespondents to the mail survey. We found that the three groups were quite similar in terms of political party divisions, gender proportions, upper and lower legislative chamber percentages, and proportions who served in legislatures that were in session more than nine months per year (full time). We found that the 74 nonrespondents to the mail survey who personally answered or whose staffs answered the profile questions but did not answer any issue questions on the follow-up phone survey had introduced more bills in the previous legislative session, had significantly larger staffs, and reported spending a significantly larger proportion of their professional time on state legislative matters than did the 62 legislators who answered the profile and issue questions by phone.

Chapter Two

Perceptions of Nuclear Weapons Risks

Section 2.1: Conceptualizing Nuclear Weapons Risks

Offsetting Dimensions of Risk

SINCE THE EARLY YEARS OF THE COLD WAR, NUCLEAR WEAPONS HAVE posed a complex array of risks to Americans that conceptually can be grouped into two general categories: (1) risks to Americans from nuclear weapons possessed by those outside the US (external nuclear weapons risks), and (2) risks to the US associated with our own nuclear weapons and how they are managed, safeguarded, and employed (domestic nuclear weapons risks). In one sense, the two categories are compounding and cumulative. If a nuclear weapon is employed against the US by another country (external risk), or if one of our own nuclear weapons is involved in a catastrophic accident in the US (domestic risk), or if a nuclear explosive device is used against the US by a terrorist group (external or domestic risk), the consequences could be similar in their disastrous implications for Americans. On the other hand, to the degree that US nuclear weapons are effective as deterrents, they can be perceived to be partially offsetting to external nuclear threats. In this sense, domestic nuclear weapons risks may be rationalized on the basis of the potential for US nuclear weapons to reduce external nuclear weapons risks. Therefore, assessing the nature of US public perceptions of risks associated with nuclear weapons requires that both dimensions of associated risks be considered. And if we want to better understand how public views of nuclear risks may be changing, we need to measure public perceptions of external and domestic nuclear weapons risks over time and in the evolving context of the post-Cold War security environment.

This chapter reports perceptions of our three 1997 respondent groups (members of American Men and Women of Science, state legislators, and the general public) regarding the changing nature of the international security environment, perceptions of external nuclear weapons risks, and domestic risks associated with our own nuclear weapons. Because many of the same measures have been used in the two previous studies in this series, comparisons of evolving public perceptions of nuclear weapons risks over time also can be shown.

Section 2.2: Perceptions of the Post-Cold War Security Environment and External Nuclear Weapons Risks

Impressions of the Security Environment

HOW HAS INTERNATIONAL SECURITY EVOLVED SINCE THE END OF THE Cold War, and what are the implications for US security? To better appreciate elite and mass perceptions of how systemic and US national security may be changing, we asked each group to consider the international environment as a whole and to assess how international security has changed since the end of the Cold War. We also asked them to evaluate how US security has changed during the same period. Answers were expressed on a scale where one meant *much less secure*, and seven meant *much more secure*. Grouped responses to both questions are shown in Figures 2.1 and 2.2.

Figure 2.1

How Has International Security Changed Since the End of the Cold War?

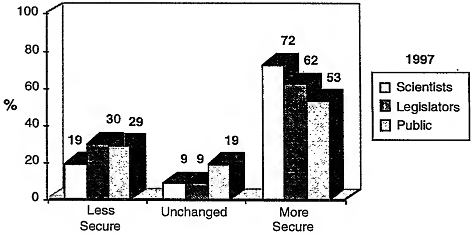
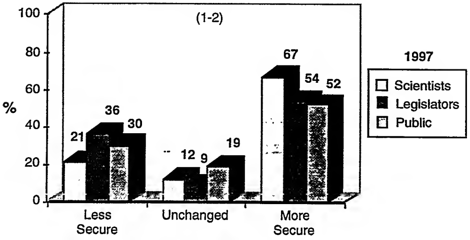


Figure 2.2 **How Has US Security Changed Since the End of the Cold War?**



A majority of each of our three groups perceived both systemic and US national security to have improved since the end of the Cold War. Mean perceptions of the scientists were statistically significantly higher than those of the other two groups for both questions ($p < .0001$).[1] Views of the legislator and general public groups about how US security has changed were not significantly different, but responding legislators perceived a significantly higher level of systemic security than did respondents from the general public ($p = .0022$).

Perceptions of Strategic Nuclear Threats

The breakup of the Soviet Union may prove to have been one of the most important factors influencing post-Cold War strategic relationships. To track the degree to which Soviet devolution is influencing US strategic security perceptions, we asked two questions in each of our three studies about the implications of the dissolution of the Soviet Union for the likelihood of nuclear conflict. One of the questions asked respondents how they thought the breakup of the Soviet Union affected the chances that the US might become involved in a war with any country in which nuclear weapons are used. Figure 2.3 compares aggregated responses among the mass and elite groups surveyed in 1997, and Figure 2.4 compares responses from the general public measured in 1993, 1995, and 1997.

Figure 2.3

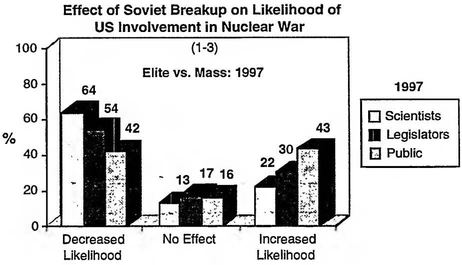
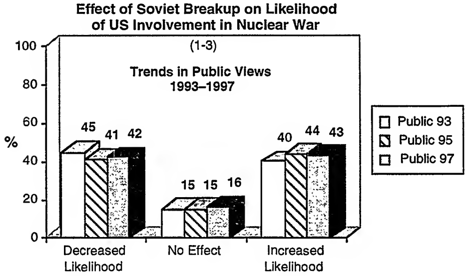


Figure 2.4



A majority of both elite groups considered the Soviet breakup to have decreased the chances that the US will become involved in a nuclear conflict, but the public was less sure. Differences in means among the three groups were all highly statistically significant. Among respondents from the general public, opinion has been rather evenly divided on this subject in each of our three measurement periods. The general public appears to be taking a more cautious approach than some elite groups to the strategic nuclear implications of the post-Cold War era.

We also asked how our respondents thought the Soviet breakup has affected the possibility of nuclear weapons being used by *any* country against *any* other country. As shown in Figure 2.5, a plurality of elites and a small majority of respondents from the general public perceived the likelihood of a nuclear conflict occurring somewhere in the international system to have increased since the breakup of the Soviet Union. Differences in means between the elite groups and the general public group were highly statistically significant (scientists vs. public: $p < .0001$; legislators vs. public: $p < .0001$).

Figure 2.5

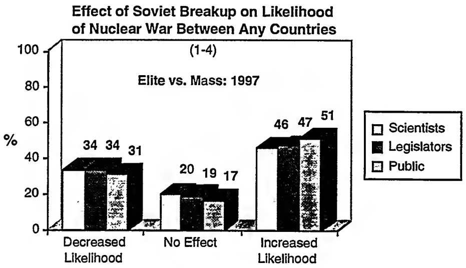
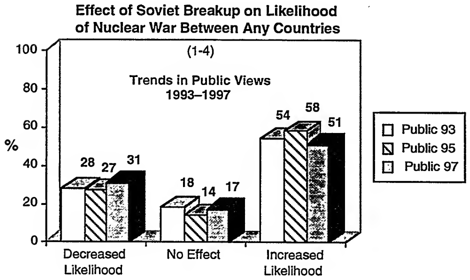


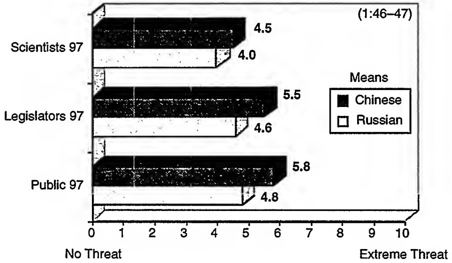
Figure 2.6



However, as shown in Figure 2.6, trends among the general public reflected a significant ($p < .0001$) drop in 1997 among those perceiving greater likelihood of nuclear conflict occurring somewhere in the system as a result of the Soviet breakup.

To more finitely measure perceived strategic nuclear threats to the US, we asked our respondents in 1997 to rate the current threat to the US posed by Russian and Chinese nuclear weapons. Answers were given on a scale where zero represented *no threat,* and ten represented *extreme threat.* Mean ratings are compared in Figure 2.7.

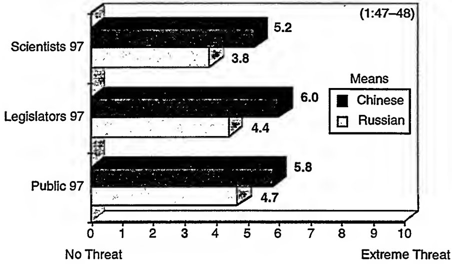
Figure 2.7 **Current Threat to US from Russian and Chinese Nuclear Weapons**



Means for each group indicated current perceived risks from Russian and Chinese nuclear weapons were around midscale, but each group considered Chinese nuclear weapons to pose the greater threat. Differences between the Chinese and Russian threats were highly statistically significant within each respondent group ($p < .0001$). The general public rated the threat from both sources higher than did either of the two elite groups. Scientists rated both threats lowest. Respondents from the state legislator sample were between the public and scientist groups, but somewhat closer to the general public.

To assess how our respondents viewed the future threat from Russian and Chinese nuclear weapons, we asked them to use the same scale to rate the threat from each source in the next ten years. Figure 2.8 summarizes mean responses.

Figure 2.8 **Threat to US from Russian and Chinese Nuclear Weapons in Next 10 Years**



Within each group, perceptions of threats from Russian nuclear weapons in the next ten years decreased, and perceived threats from Chinese nuclear weapons increased (except that public perceptions remained steady at 5.8). Intergroup comparisons were similar to those in Figure 2.7, except that the state legislator group rated the Chinese threat slightly higher on average than did the general public group.

China Replacing Russian Threat

Note that the questions did not differentiate among kinds of potential threats posed by nuclear weapons in either case. In formulating their responses, participants could have considered threats from offensive nuclear weapons, threats posed by nuclear proliferation, and threats associated with the security and control of nuclear forces and resources. Regardless of the components, these two measures indicated that, in the views of all three respondent groups, strategic nuclear threats to the US posed by Russia in the early post-Cold War era have been surpassed by current and potential future nuclear threats from China.

Nuclear Proliferation and Terrorism

In an effort to estimate perceptions about the potential for nuclear proliferation, we asked our three groups to assess the effect of the Soviet breakup on the likelihood that nuclear weapons would further spread to other countries. Because this question was asked in 1993 and 1995, we also were able to show trends in public perceptions. Figure 2.9 contrasts responses from elite and mass groups in 1997, and Figure 2.10 shows responses of the general public in each of the three study phases.

Figure 2.9 Effect of Soviet Breakup on Likelihood of Further Nuclear Proliferation

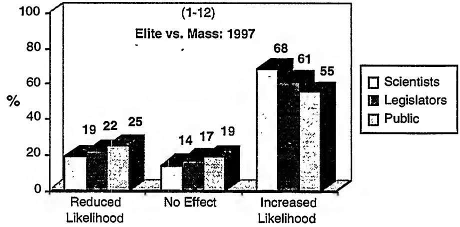
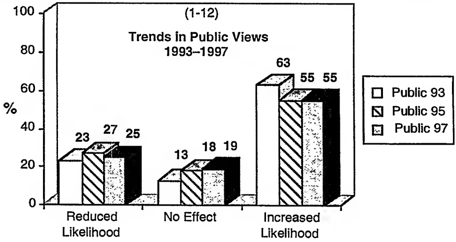


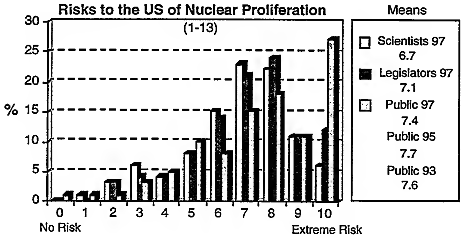
Figure 2.10 Effect of Soviet Breakup on Likelihood of Further Nuclear Proliferation



A majority of respondents from all three groups in 1997 considered the risk of nuclear proliferation to have increased as a result of the Soviet breakup. However, there were substantial differences in perceptions between groups. Members of American Men and Women of Science registered the largest concerns, followed by the state legislator and general public groups. Most respondents among the general public surveyed in each of the three phases of the study reported likely increases in proliferation. However, majority public opinion on this issue declined from 1993 to 1995 and held steady in 1997, with 55 percent of respondents from the general public considering the risk of nuclear proliferation to have increased since the breakup of the Soviet Union.

We also wanted to know about perceptions of the implications of further nuclear proliferation. Figure 2.11 summarizes responses among the three 1997 groups to a question asking participants to assess the risks to the US if more countries gain nuclear weapons.

Figure 2.11

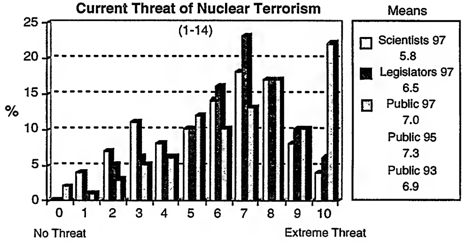


1-13 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0010	<.0001	.0017	.0051	.0228	.5918

All three groups considered further nuclear proliferation to pose substantial risks to the US, but scientists considered those risks to be significantly lower than either of the other two 1997 groups. Change in mean public ratings since 1993 is shown in the box on the right. The statistical significance of differences in group means in 1997 and the significance of mean changes in public perceptions since 1993 are shown in the table below the graph. The mean risk recorded in 1997 was significantly lower than that reported in 1995 and 1993.

To provide general indications of perceptions about the potential for nuclear terrorism, we asked two questions in each of the three studies in this series.[2] The first question asked respondents to rate their perceptions of the current threat of nuclear terrorism occurring anywhere in the world using a scale where zero meant *no threat,* and ten meant *extreme threat.* The distribution of responses given in 1997 are shown in Figure 2.12, along with a comparison of means among elite and mass groups and among the general public since 1993.

Figure 2.12

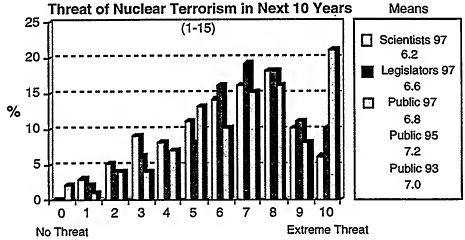


1-14 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	<.0001	.0010	.1110	<.0001

Considerable differences are evident in the distribution patterns. Note that the modal response for the general public in 1997 was ten, while the modal response for both elite groups was seven. On average, scientists rated the current threat of nuclear terrorism occurring anywhere in the world significantly lower than did the general public and state legislators. Changes among the general public over time included a significant increase in 1995 followed by a significant decrease in 1997 to approximately the level reported in the first study.

A second question about the potential for nuclear terrorism asked in each of the three studies dealt with future expectations. Using the same zero to ten scale, respondents were asked to assess the threat of nuclear weapons being used by terrorists anywhere in the world during the next ten years. Results are summarized in Figure 2.13.

Figure 2.13



1-15 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0001	<.0001	.1068	<.0001	.0769	.0055

Similar distributions and central tendencies are evident. The modal response for the general public group in 1997 is again the highest point on the scale, while the mode for the legislator group is eight, and the mode for the scientist group is seven. Means again indicate highest threat perceptions among the public, and lowest among the scientists. Measures among the public over time indicate a statistically significant increase in 1995 followed by a highly significant decrease in 1997 to a level below both 1995 and 1993. Also note that members of the two elite groups projected somewhat higher future threats compared to the current assessment, while respondents from the general public in 1997 projected a slightly lower threat from nuclear terrorism over the next ten years. However, we also should note that in each of the three studies, all groups considered the threat posed by nuclear terrorism to be substantial, both in the present and for the foreseeable future.

Combined Index of External Nuclear Risk Perceptions

By combining several of the individual measures of external nuclear risk, we can create a more comprehensive and robust indicator. For an external nuclear risk index, we combined responses to the six following issues that were discussed above.

- Perceived change since the end of the Cold War in the likelihood of the US becoming involved in a nuclear conflict (1-3)

- Perceived change since the end of the Cold War in the likelihood that nuclear weapons will be used by any country against any other country (1-4)

- Perceived change since the end of the Cold War in the likelihood of further nuclear proliferation (1-12)

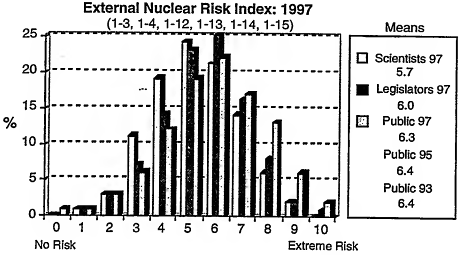
- The implications for the US of further nuclear proliferation (1-13)

- Perceptions of the current threat of nuclear terrorism occurring anywhere in the world (1-14)

- Perceptions of the threat of nuclear terrorism occurring anywhere in the next ten years (1-15)

Figure 2.14 shows the distribution of the combined responses for each of the three groups in 1997, and compares mean responses for the same questions asked in 1995 and 1993.

Figure 2.14



ExRisk ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0008	<.0001	<.0001	.6396	.0836	.1452

External Risk Perceptions Not Declining

The same patterns discussed above also were evident in the external risk index. The highest level of risk was perceived by respondents from the general public, followed by state legislators, and the lowest level was held by members of American Men and Women of Science. Differences in means among all three groups were highly statistically significant. However, on average, all three 1997 groups rated external nuclear risks above midscale. Thus, six years after the dissolution of the Soviet Union and the end of the Cold War, two elite groups and a group of citizens drawn from the general public all perceived the combined risks of nuclear conflict, nuclear proliferation, and nuclear terrorism to remain at substantial levels. Furthermore, the level trend in perceptions of combined external nuclear risks among respondents from the general public between 1993 and 1997 indicated that public perceptions of external nuclear risks were not declining.

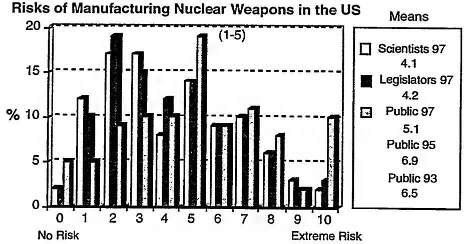
Section 2.3: Perceptions of Domestic Nuclear Weapons Risks

Of course not all risks to the American public derive from nuclear weapons possessed by others. Another key dimension of nuclear risk perceptions consists of views about risks associated with developing and maintaining the US nuclear weapons stockpile. How much risk do citizens think is related to such tasks as manufacturing, transporting, storing, and maintaining the US nuclear arsenal? Post-Cold War nuclear arms reduction agreements obligate the US to disassemble large numbers of nuclear warheads. What risks are perceived to be associated with deactivating and storing nuclear warheads? How likely are US nuclear weapons to be involved in an accident? What are the chances that a US nuclear weapon might be employed without proper authorization? To assess public perceptions of these and related domestic nuclear weapons risks, we asked a series of questions in each of the three phases of this project about managing, controlling, and reducing the US nuclear arsenal. Findings are presented in this section.

Risks of Managing US Nuclear Weapons

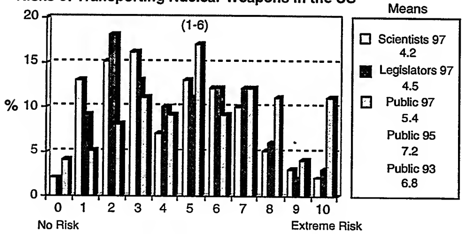
We asked respondents to assess the risks associated with five nuclear weapons management tasks: manufacturing, transporting, storing, and disassembling nuclear weapons in the US, and storing radioactive materials in the US from disassembled weapons. Each was answered on a scale where zero meant *no risk,* and ten meant *extreme risk.* Figures 2.15–2.19 show the distributions of responses and means for each question among our three 1997 groups, and they compare means among the general public groups over time.

Figure 2.15 **Risks of Manufacturing Nuclear Weapons in the US**



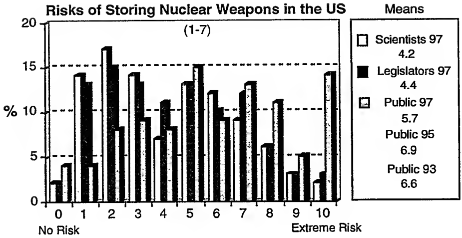
1-5 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.8189	<.0001	<.0001	<.0001	<.0001	.0001

Figure 2.16 **Risks of Transporting Nuclear Weapons in the US**



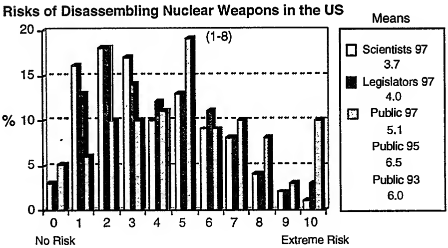
1-6 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0896	<.0001	<.0001	<.0001	<.0001	<.0001

Figure 2.17



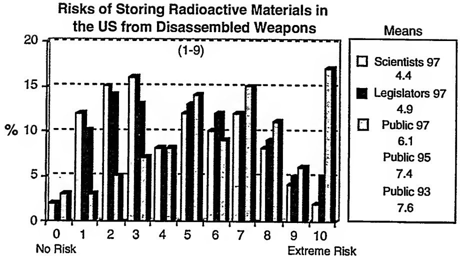
1-7 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0896	<.0001	<.0001	<.0001	<.0001	.0001

Figure 2.18



1-8 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0204	<.0001	<.0001	<.0001	<.0001	<.0001

Figure 2.19



1-9 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0021	<.0001	<.0001	<.0001	<.0001	.0403

For each of these activities, survey participants from the general public in 1997 perceived substantially higher risks to be associated with tasks relating to managing the US nuclear arsenal than did participating elites from the scientific and legislative communities. However, for each activity, mean perceptions of risks among respondents from the general public in 1997 were sharply lower than responses to the same questions asked in 1995.

Calibrating Domestic Nuclear Risk Perceptions

The very large differences between 1995 and 1997 in mean perceptions of risks associated with managing the US nuclear arsenal caused us to look for possible question order effects in the two instruments.[3] While this set of five questions appeared very early and with the same internal sequence in both the 1995 and 1997 survey instruments, there were differences in some risk questions that preceded them. In 1995, these five questions on domestic risk were preceded by two questions asking respondents to rate the risks associated with driving an automobile and owning a firearm. In 1997, the domestic risk series followed two new questions about perceptions of how international and US national security has changed since the end of the Cold War (Figures 2.1 and 2.2) and the perceived effect of the Soviet breakup on the likelihood that nuclear conflict will occur (Figures 2.3 and 2.5).[4] To assess the implications of different lead-in issues for the ways in which the risks of managing nuclear weapons were perceived, we conducted an experiment to directly compare the two question sequences. The 1995 lead-in sequence and the 1997 lead-in sequence, each followed by the five weapons management risk questions, were asked of randomly selected samples of the general public 18 years of age or older in Albuquerque, New Mexico. The 1995 lead-in sequence and question set was answered by 323 respondents; the 1997 lead-in and the same five questions on nuclear weapons management risks were answered by 353 participants.[5] Mean responses to each of the common questions are summarized in Table 2.1.

Table 2.1 Question Order Effect Test: Domestic Nuclear Risk Perceptions

Test Issue (0 = No Risk — 10 = Extreme Risk)	Mean Test Responses: 1995 Lead-in	1997 Lead-in	Diff.	P Value
1-5. Manufacturing nuclear weapons	6.45	5.22	–1.23	<.0001
1-6. Transporting nuclear weapons	6.94	5.62	–1.32	<.0001
1-7. Storing existing nuclear weapons	6.37	5.47	–0.90	.0002
1-8. Disassembling nuclear weapons	6.18	5.15	–1.03	<.0001
1-9. Storing radioactive materials fom disassembled weapons.	7.04	5.80	–1.24	<.0001

Significant differences in responses resulting from the two different lead-in sequences indicated that responses to our five questions on nuclear weapons management risks in the 1995 and 1997 national surveys systematically varied due to the different risk contexts within which the weapons management questions were answered. In the 1995 sequence, participants first answered questions about the risks associated with driving a car and owning a firearm—activities that were within the personal experience of many respondents. When the questions on managing nuclear weapons immediately followed, respondents appear to have assessed those risks in the relative context of driving a car and owning a firearm. Compared to either of these activities, many participants may have considered risks associated with managing nuclear assets to be of greater consequence, and may have given correspondingly higher assessments.[6] In contrast, the lead-in questions in 1997 were about international and national security and the potential for nuclear war. Given this context, respondents may have judged the risks of managing US nuclear weapons to be somewhat lower.

Risk Context

Systematic differences in responses induced by the different risk contexts may mask actual changes in views between 1995 and 1997 about nuclear weapons management risks. To estimate the actual changes, we subtracted the differences determined above in the question order experiment from the actual 1995 data and compared it to the actual 1997 data. The difference between recalibrated 1995 data and actual 1997 data represent that portion of the recorded change that is independent of differing risk contexts. Results are presented in Table 2.2.

Table 2.2 Actual Change After Recalibration for Differing Risk Contexts

Issue (0 = No Risk — 10 = Extreme Risk)	Means					
	Actual 1995	Adjustment	Recal. 1995	Actual 1997	Actual Change	p Value
1-5. Manufacturing nuclear weapons	6.92	–1.23	5.69	5.10	–.59	<.0001
1-6. Transporting nuclear weapons	7.23	–1.32	5.91	5.42	–.49	<.0001
1-7. Storing existing nuclear weapons	6.94	–0.90	6.04	5.71	–.33	.0004
1-8. Disassembling nuclear weapons	6.50	–1.03	5.47	5.06	–.41	<.0001
1-9. Storing radioactive materials fom disassembled weapons	7.45	–1.24	6.21	6.12	–.09	.3053

These results indicate that when the effects of risk context are held constant, modest, but statistically significant, reductions occurred from 1995 to 1997 in the risks members of the general public perceived to be associated with producing, storing, transporting, and disassembling nuclear weapons in the US and storing radioactive materials in the US from disassembled weapons.

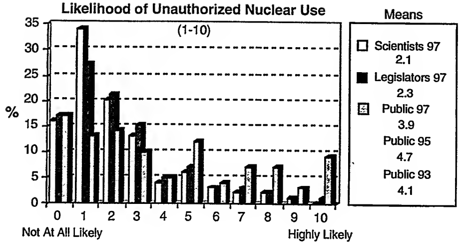
Accidental or Unauthorized Use of US Nuclear Weapons

Additional dimensions of potential risks associated with US nuclear weapons relate to their control and safety. To gauge public perceptions about the possibility that US nuclear weapons might be employed without legal authorization, we asked the following question:

> Some people worry that a nuclear weapon might someday be used by US forces without the president's authorization. On a scale where zero means *not at all likely,* and ten means *highly likely,* how would you rate the likelihood of a *US* nuclear weapon being used within the next 25 years without presidential authorization? (1-10)

Responses from each of the three 1997 groups are displayed in Figure 2.20. Respondents from the scientist group rated the risks of unauthorized nuclear use lowest at 2.1, followed closely by our legislator respondents at 2.3; the general public group judged the risk highest at 3.9. All were well below midscale.

Figure 2.20



1-10 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0997	<.0001	<.0001	<.0001	.2173	<.0001

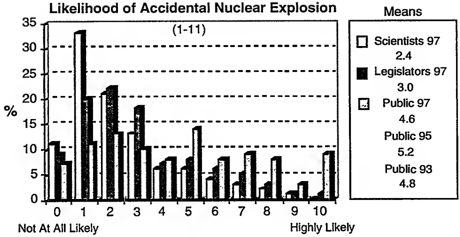
Respondents from the general public registered a significantly lower level of concern in 1997 than was recorded in 1995, and slightly lower than that measured in 1993.

To complete this series of inquiries, we asked respondents about the likelihood of a nuclear accident using the following question:

> Some people are concerned about the possibility of an accidental explosion of a nuclear weapon. On the same scale from zero to ten, how would you rate the likelihood of an accident involving a *US* nuclear weapon causing an unintended nuclear explosion? (1-11)

Responses are compared in Figure 2.21.

Figure 2.21



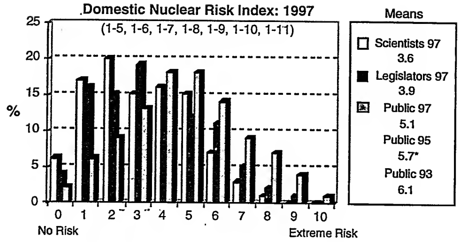
1-11 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	<.0001	<.0001	.0489	.0013

On average, each of the three groups rated the likelihood of an accidental nuclear explosion slightly higher than that of the likelihood of unauthorized use. Elites rated the likelihood of a nuclear accident significantly lower than did respondents from the general public, and members of the public in 1997 perceived a lower likelihood than did corresponding groups in the two previous surveys.

Combined Index of Domestic Nuclear Risk Perceptions

By combining risks perceived by our three respondent groups to be associated with managing the US nuclear arsenal (Figures 2.15–2.19), and perceptions of the likelihood of unauthorized or accidental nuclear use (Figures 2.20–2.21), we created the index of domestic nuclear risk perceptions shown in Figure 2.22.

Figure 2.22



DomRsk ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95*	Pub 97 Pub 93	Pub 95* Pub 93
p-value	.0055	<.0001	<.0001	<.0001	<.0001	<.0001

*Recalibrated

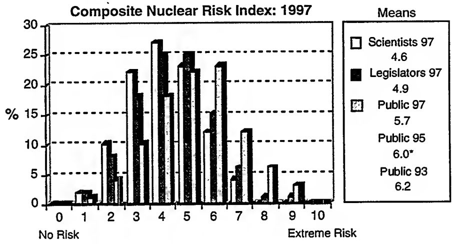
Declining Domestic Risk Perceptions

Respondents from the technical community rated overall risks from the US nuclear arsenal lowest, with a mean of 3.6, followed by respondents from the legislator group with a significantly higher mean of 3.9. Respondents from the general public reflected the highest rating of mean risk at 5.1. Comparing general public responses over time required that we use the recalibrated means for the 1995 data about risks of managing nuclear weapons that were developed in the previous section. The resulting trend indicates that those surveyed in 1997 considered the risks to be significantly lower than respondent groups from the general public in 1995 or 1993.

Section 2.4: Creating a Composite Nuclear Risk Index

BY COMBINING THE NUCLEAR WEAPONS EXTERNAL RISK INDEX SHOWN in Figure 2.14 with the domestic nuclear risk index shown in Figure 2.22, we create a composite picture of perceptions of nuclear weapons risks. The result is both more comprehensive and robust than either of the component indices, and it provides at least three useful opportunities. First, it allows general trend analysis in composite risk perceptions. Second, a composite risk index is more convenient than separate measures of external and domestic risks for analyzing certain relationships between nuclear risk perceptions and respondents' demographics and beliefs. Third, it is also a more efficient measure for examining the relationships between nuclear risk perceptions and individual policy and spending options. Figure 2.23 depicts the composite nuclear weapons risk index.

Figure 2.23



CmpRsk ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95*	Pub 97 Pub 93	Pub 95* Pub 93
p-value	.0002	<.0001	<.0001	<.0001	<.0001	.0101

*Recalibrated

Among the three 1997 groups, respondents from the general public perceived the highest levels of combined external and domestic nuclear weapons risks at 5.7, followed by participating state legislators at 4.9, and participants from American Men and Women of Science perceived the lowest levels of combined nuclear weapons risks at 4.6. Differences in mean risk perceptions among the 1997 groups were all highly statistically significant. There was also a statistically significant trend in composite risk perceptions among our three respondent groups from the general public, with mean perceptions of risks declining from 6.2 in 1993 to 5.7 in 1997.

Section 2.5: Summarizing Elite and Mass Perceptions of Nuclear Weapons Risks

THE RISKS POSED BY NUCLEAR WEAPONS ARE BEST CONSIDERED WITHIN the larger context of the post-Cold War security environment. A majority of each of our three respondent groups in 1997 characterized the current environment as more secure than that which existed at the end of the Cold War, whether considering the international community as a whole (Figure 2.1) or US national security (Figure 2.2).

The relative nature of state level nuclear threats to the US from its two principal nuclear rivals, Russia and China, were reported to have changed from the Cold War era during which Russia was perceived by many to pose the greatest nuclear challenge. Whether considering today's nuclear threat or that foreseen within the next decade, all three groups in our 1997 survey perceived the nuclear threat to the US posed by China to be greater than that posed by Russia (Figures 2.6 and 2.7).

Risks to the US public associated with nuclear weapons can be grouped into (1) risks deriving from nuclear weapons possessed by others, which we termed external nuclear weapons risks, and (2) risks deriving from nuclear weapons possessed by the US, which we termed domestic nuclear weapons risks. To gain a broad gauge measure of public perceptions of external nuclear weapons risks, we employed a series of questions about the perceived potential for nuclear conflict, nuclear proliferation, and nuclear terrorism. Results were then combined to produce an index of external nuclear weapons risk perceptions and compared to the same grouped measures taken in 1993 and 1995. Results provided two important dimensions of nuclear weapons risk perceptions: elite vs. mass comparisons and over time analysis of evolving public perceptions.

As shown in Figure 2.14, results indicated that participants from the American Men and Women of Science group rated external nuclear risks at 5.7 on a scale where zero meant no risk, and ten meant extreme risk. Respondents from state legislatures rated composite external nuclear risks statistically significantly higher at 6.0 ($p = .0008$). Respondents from the general public rated the same risks highest of the three groups at 6.3, a level that was significantly greater than either scientists ($p < .0001$) or legislators ($p < .0001$).

When we compared mean public perceptions of external risks in 1997 to those previously measured in 1995 and 1993, we found a high degree of stability. Prevailing views among the general population about the risks posed to the US by others' nuclear weapons have not appreciably declined since 1993.

As shown in Figure 2.22, we found large intergroup and intragroup differences in perceptions of domestic nuclear risks associated with maintaining, managing, and controlling the US nuclear stockpile. Mean composite domestic nuclear weapons risks reported in 1997 were lowest among scientist respondents, at 3.6 on a zero to ten scale. Participating legislators rated composite domestic nuclear weapons risks significantly higher at 3.9 ($p = .0055$), and respondents from the general public rated them significantly higher than both elite groups at 5.1 (public vs. scientists: $p < .0001$; public vs. legislators: $p < .0001$).

Public perceptions in 1997 of domestic nuclear weapons risks were much lower than those reported in 1995 or 1993. Differences in means were highly significant for both comparisons ($p < .0001$).

As shown in Figure 2.23, when we combined perceptions of external and domestic nuclear weapons risks to form a composite risk index, we found the expected pattern of highest combined risks being perceived by the general public group at 5.7, followed by the legislator group at 4.9, and the scientist group at 4.6. Differences in means were all highly significant (scientists vs. legislators: $p = .0002$; scientists vs. public: $p <.0001$; legislators vs. public: $p <.0001$).

Composite nuclear weapons risk perceptions among respondents from the general public declined from 6.2 in 1993 to 5.7 in 1997, a highly statistically significant decrease ($p <.0001$).

With this picture of evolving nuclear weapons external and domestic risk perceptions, we now turn to measures of nuclear weapons benefits in Chapter Three.

End Notes

[1] Throughout this study, we report the results of analyses of variance (ANOVAs) in terms of p-value, which is a measure of the probability that differences in means between groups would have occurred by chance. In this instance, the difference in means between the scientist respondent group and that of the legislator and general public respondents would have occurred by chance fewer than one in 10,000 times. For most purposes in this report, statistical significance will be attributed to those differences which would have occurred fewer than five times in 100. However, statistical significance does not always equate to operational relevance. The relevance of statistically significant differences must be judged in the context of the variables being measured and the groups being compared.

[2] For an inquiry into public attitudes about the relationship between perceived threats of terrorism and implications for an open society of measures to prevent terrorism, see Kerry G. Herron and Hank C. Jenkins-Smith, 1995, *Evolving Perceptions of Security: US National Security Surveys 1993–1995,* document ID: SAND 96-1173, Albuquerque, NM: Sandia National Laboratories, pp. 86–90.

[3] Because individual survey questions are not asked in isolation, but rather as items of sequence related to previous questions, the order or context in which survey questions appear may potentially influence responses. Such potential influences are termed "question order effects" and can be divided into two primary components. The first is related to information associated with previous questions that may either add to a respondent's knowledge or establish a context in which interpretations of subsequent questions are influenced. The second component relates to consistency bias, which is the desire on the part of survey respondents to be consistent with answers to related questions. Therefore, there is a tendency for survey participants to shape answers so as to conform with earlier responses to related inquiries. Furthermore, survey instrument design principles ordinarily include grouping related questions, which can work at cross-purposes with avoiding question order effect. For discussions of question order effect, see: (1) Howard Schuman and Stanley Presser, 1996, *Questions and Answers in Attitude Surveys: Experiments on Question Form, Wording, and Context,* Thousand Oaks, CA: SAGE Publications; (2) Seymour Sudman, Norman M. Bradburn and Norbert Schwarz, 1996, *Thinking About Answers: The Application of Cognitive Processes to Survey Methodology,* San Francisco: Jossey-Bass Publishers;

(3) Herbert F. Weisberg, John A. Krosnick, and Bruce D. Bowen, 1996, *An Introduction to Survey Research, Polling, and Data Analysis,* 3rd. ed., Thousand Oaks, CA: SAGE Publications; and (4) Herbert H. Clark and Michael F. Schober, 1992, "Asking Questions and Influencing Answers," in *Questions About Questions: Inquiries into the Cognitive Bases of Surveys,* Judith M. Tanur, ed., New York: Russell Sage Foundation.

[4] Constructing a survey instrument necessarily involves making a number of considered judgements. In our 1995 survey, the questions regarding risks of driving a car and owning a handgun were asked as part of a test to compare perceived nuclear risks with perceptions of better known and more familiar risks. These questions were asked prior to the nuclear risk questions in part to assist the respondent in answering the risk items by beginning with the more familiar hazards. In our 1997 survey, the priority shifted to evaluating respondents' overall assessments of international security. Using a reverse-funnel approach, these more general questions preceded the specific nuclear risk items. The implications for our over time comparisons became evident when we observed the magnitude of the percent of risk changes between the 1995 and 1997 surveys. This required the experiment and calibration described here.

[5] The test survey was conducted by telephone in Albuquerque, New Mexico during February 9–22, 1998. The survey was based on a random digit dialing sample with 675 completed interviews, a response rate of 73 percent, and a sampling error of $\pm$ 4 percent.

[6] For a comparison of measures of perceived risks of different kinds, see Paul Slovic, 1987, "Perception of Risk," *Science,* 236:280–85.

Chapter Three

Perceptions of Nuclear Weapons Benefits

Section 3.1: Conceptualizing Nuclear Weapons Benefits

Additive Dimensions of Benefits

LIKE THE NUCLEAR WEAPONS RISKS DISCUSSED IN CHAPTER TWO, potential benefits of US nuclear weapons can be conceptualized in two general categories. External nuclear weapons benefits refer to enhancements to US security and influence perceived to derive from US nuclear weapons. Domestic nuclear weapons benefits refer to perceptions of benefits that may be associated with smaller forces, defense related jobs, and technological transfers made possible by US nuclear weapons capabilities. However, unlike perceptions of external and domestic nuclear weapons risks, which may be partially offsetting, perceptions of external and domestic nuclear benefits are mutually reinforcing.

In an effort to better understand the degree to which members of various US publics perceive both categories of benefits to derive from the US nuclear arsenal, we asked a series of questions designed to illuminate perceptions of external and domestic nuclear weapons benefits in each of the three studies in this series. This chapter reports perceptions of nuclear weapons benefits in 1997 among respondents from American Men and Women of Science, state legislators, and the general public. Because these measures were developed and improved during previous studies in this series, comparisons of evolving public views of nuclear weapons benefits over time also are possible.

Section 3.2: Perceptions of External Nuclear Weapons Benefits

Importance of Nuclear Weapons to US Influence and Status

To appreciate the degree to which members of elite and mass publics considered nuclear weapons to contribute to US international influence and status, we asked the following.

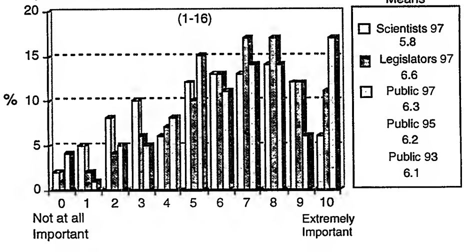
- *Lead-in:* Next we turn to broad issues of US leadership. The next several questions use a scale where zero means *not at all important,* and ten means *extremely important.*

- First, how important are US nuclear weapons for US influence over international events? (1-16)

- How important are US nuclear weapons for maintaining US status as a world leader? (1-17)

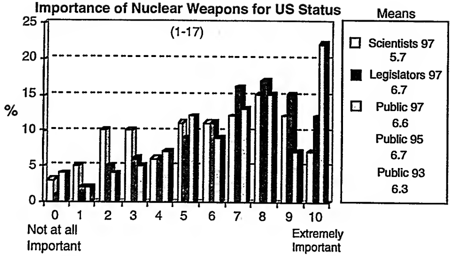
Figures 3.1 and 3.2 show responses among the 1997 groups, and compare them with means from our previous surveys of the general public.

Figure 3.1: Importance of Nuclear Weapons for US Influence



1-16 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.0665	.4651	.0352	.1912

Figure 3.2



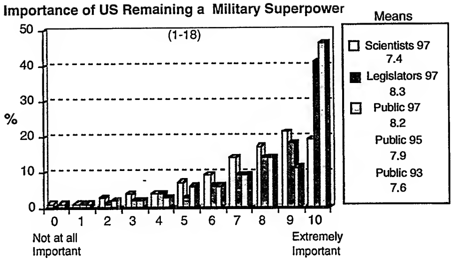
1-17 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.5619	.3557	.0018	<.0001

For each question, respondents from all three groups in 1997 and previous samples of the general public in 1993 and 1995 placed the importance of US nuclear weapons above midscale on average. The highest valuations were from state legislators in 1997 (possibly inflated by response bias) and respondents from the general public groups in each of our three studies. We would not have been surprised to find a gradual *decline* in the perceived importance of nuclear weapons for US influence and status in the post-Cold War environment. However, respondents from the general public samples in 1995 and 1997 reflected a statistically significant *increase* in perceived importance of US nuclear weapons compared to the 1993 base line measure. Scientist respondents in 1997 considered nuclear weapons to be significantly less important for US influence and status than did the legislator or general public groups.

Importance of the US Remaining a Military Superpower

A third related measure was provided by asking respondents how important it is for the US to remain a military superpower. Answers were provided on the same scale where zero meant *not at all important,* and ten meant *extremely important.* Results are shown in Figure 3.3.

Figure 3.3



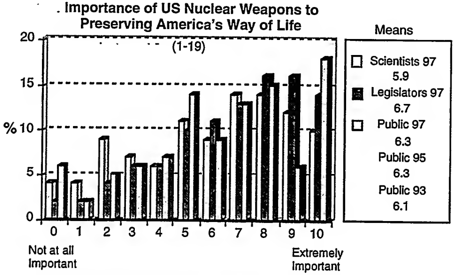
1-18 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.2648	.0275	<.0001	<.0001

Mean responses among our three groups in 1997 varied from 7.4 for participants from the American Men and Women of Science, to 8.3 for participating state legislators. Note that the modal response for both the legislator and general public groups was ten. While still substantially above midscale, mean scientist ratings were significantly lower than those reported by the other two groups. Also note the over time trend among the general public groups toward higher valuations of the importance of the US maintaining its capabilities as a military superpower. The increase from 1993 to 1995 and 1997 was consistent and statistically significant.

Importance of US Nuclear Weapons to Preserving the American Way of Life

Our final question in this series examined perceptions of nuclear weapons in a broad sociological context by asking respondents the following question: "How important have nuclear weapons been to preserving America's way of life?" (1-19) We made no effort to define or discuss what was meant by the term "America's way of life," because we wanted each respondent to relate their perspectives of the US nuclear arsenal, from its beginning to its current status, to their individual concept of the American way of life, regardless of normative judgments about the nature of US society. Responses were provided on the same zero to ten scale previously used. As shown in Figure 3.4, mean responses among the general public have been quite stable over time, only varying from 6.1 in 1993 to 6.3 in both 1995 and 1997.

Figure 3.4



1-19 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	.0008	.0015	.8033	.0608	.0209

Among our three 1997 groups, legislators considered nuclear weapons to have been most important to preserving the American way of life, rating it at 6.7 on average. Scientists' mean response was much lower at 5.9. Nevertheless, as has been the pattern in this series, each of these three very different groups valued nuclear weapons above midscale.

Importance of Nuclear Deterrence

In 1995 and 1997 we added the following series of questions designed to measure perceptions of the importance of nuclear deterrence.

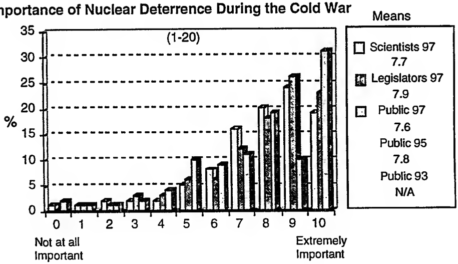
- The next three questions ask about your perceptions of nuclear deterrence. First, using the same scale where zero is *not at all important,* and ten is *extremely important,* how important was nuclear deterrence in preventing nuclear conflict during the Cold War? (1-20)

- How important are our nuclear weapons for preventing other countries from using nuclear weapons against us today? (1-21)

- For this question, zero means *not at all effective,* and ten means *extremely effective.* If more countries acquire nuclear weapons in the future, how effective will nuclear deterrence be in preventing nuclear wars from occurring anywhere in the world? (1-22)

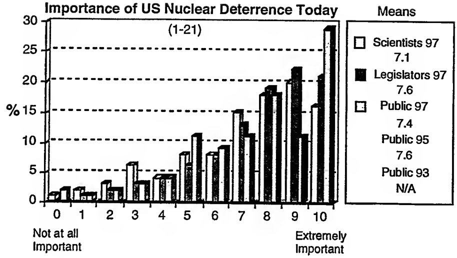
Results from the 1997 survey are charted in Figures 3.5–3.7. Mean responses from the general public groups in our 1995 and 1997 studies also are compared.

Figure 3.5 Importance of Nuclear Deterrence During the Cold War



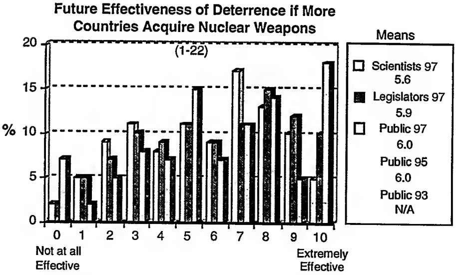
1-20 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.1593	.2581	.0171	.0402	NA	NA

Figure 3.6



1-21 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0004	.0035	.1758	.0251	NA	NA

Figure 3.7



1-22 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0657	.0014	.5060	.9049	NA	NA

Past and Present Deterrence

All three groups of respondents in 1997 considered nuclear deterrence to have been very important during the Cold War. Mean values were between 7.6 and 7.9. The importance of nuclear deterrence in today's post-Cold War environment was rated only marginally lower, with means for all three groups varying between 7.1 and 7.6. However, there was a small but statistically significant decline from 1995 in the perceived importance that respondents from the general public attributed to nuclear deterrence in both the past and the present.

Future Deterrence

Our third question in this series changed the frame of reference in three ways. It asked respondents to project into the future; it asked them to assume a more widely proliferated international system; and it changed the measure from perceived importance to projected effectiveness. Compared to the previous two questions, participants from all three 1997 groups were less sure of the future effectiveness of nuclear deterrence in a more proliferated system. Nevertheless, each of our respondent groups rated the likely future effectiveness of nuclear deterrence under such circumstances to be above midscale on average.[1] Mean public perceptions on this issue remained steady from 1995 to 1997.

Combined Index of External Nuclear Weapons Benefits

By combining responses to the series of questions about the importance of US nuclear weapons and the three questions that investigated perceptions of nuclear deterrence, we can construct an index reflecting combined perceptions of these aspects of external nuclear weapons benefits. The index combined perceptions about the following issues:

- The importance of nuclear weapons for US influence over international events (1-16)
- The importance of nuclear weapons for maintaining US status as a world leader (1-17)
- The importance of the US remaining a military superpower (1-18)

- The importance of US nuclear weapons for preserving America's way of life (1-19)

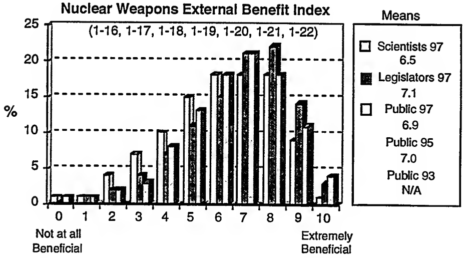
- The importance of nuclear deterrence in preventing nuclear conflict during the Cold War (1-20)

- Today's importance of US nuclear weapons for preventing others from using nuclear weapons against us (1-21)

- The effectiveness of nuclear deterrence for preventing future nuclear wars in a more proliferated system (1-22)

Figure 3.8 displays combined responses to the above questions from our three 1997 groups. Because the questions dealing with nuclear deterrence were not asked in 1993, means for participants from the general public are comparative only for 1995 and 1997.

Figure 3.8



ExBen ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.0750	.1623	NA	NA

Our three 1997 groups reflected high ratings for perceived external benefits deriving from US nuclear weapons. Respondents from the legislator and general public groups rated combined benefits at 7.1 and 6.9 respectively.[2] The 0.2 point difference was not statistically significant at the 95 percent confidence level. However, the scientist group's composite rating of external nuclear weapons benefits was significantly lower than either of the other groups at 6.5.

Perceptions from our samples of the general public were not significantly different in 1997 from those reported two years earlier. A general decline in the value that members of the general public attribute to nuclear weapons for achieving US national interests in the post-Cold War era might be logically hypothesized, but our data do not indicate that such a decrease has yet occurred.

Section 3.3: Perceptions of Other Nuclear Weapons Benefits

MEASURING POTENTIAL DOMESTIC BENEFITS OF US NUCLEAR weapons is more difficult than gauging perceptions about external nuclear weapons benefits. Detailed assessments of potential domestic benefits associated with US nuclear weapons capabilities requires differentiating nuclear from nonnuclear investments, which is a complex task. One reason is that many US systems have the capability to employ both nuclear and nonnuclear weapons. Some primarily conventional forces, such as attack aircraft, tanks, artillery, and ships, may also have the capabilities to employ nuclear munitions. Other systems that were designed primarily as strategic delivery systems, such as the B-52 and B-1 aircraft may later be adapted to primarily conventional roles. Second, expenditures for personnel and support equipment are not easily separated into nuclear or nonnuclear capabilities. Third, research and development investments for many systems span both nuclear and conventional applications. Fourth, some portions of investments for highly sensitive strategic intelligence and other operational capabilities associated with nuclear weapons capabilities

Separating Nuclear from Nonnuclear

are reported under funding categories that are sufficiently sensitive to be protected from open public debate. Finally, substantial investments in nuclear weapons capabilities are made outside the defense budget. For example, Department of Energy investments in nuclear weapons development and stockpile stewardship are directly related to US nuclear weapons capabilities, but are not in the same categories as Department of Defense direct expenditures on operational nuclear forces. Because of these and other complexities, those portions of US expenditures associated with nuclear weapons capabilities are very difficult to separate from those portions of the budget associated with purely non-nuclear capabilities.

Because of these and other related complexities, we asked our respondents about their perceptions regarding the following three dimensions of domestic benefits related to defense expenditures.

- Using a scale where one means you *strongly disagree,* and seven means you *strongly agree*, please respond to the following statement. Having a nuclear arsenal means the US can spend less for national defense than would be necessary without nuclear weapons. (1-32)

- The next two questions deal with the economic value of defense industry jobs and defense related technologies. Both use a scale where one means *little economic value,* and seven means *great economic value.* First, how do you rate the economic value of defense industry jobs in America? (1-33)

- Next, how do you rate the economic value of technological advances in defense industries for other areas of the US economy? (1-34)

Grouped responses are compared in Figures 3.9–3.13.

Figure 3.9 **Nuclear Weapons Allow the US to Spend Less for Defense**

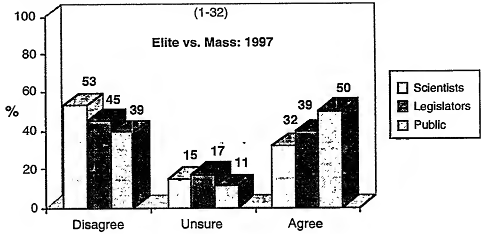
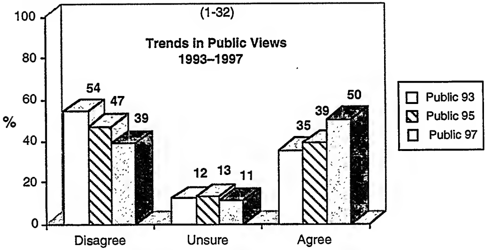


Figure 3.10 **Nuclear Weapons Allow the US to Spend Less for Defense**



Our three respondent groups in 1997 reported considerably different views about whether nuclear weapons allow the US to spend less for defense than would be required without a nuclear arsenal. A majority of scientist respondents disagreed with that assertion, while opinion was more evenly divided among the state legislator group, with 45 percent disagreeing and 39 percent agreeing with the statement. Among respondents from our general public group, 50 percent agreed, and 39 percent disagreed. Differences in mean perceptions among all three

1997 groups were highly statistically significant (scientists vs. legislators: $p = .0024$; scientists vs. public: $p < .0001$; legislators vs. public: $p = .0008$).

When we compared responses of samples from the general public in 1997 with those provided in 1995 and 1993, we found a clear trend. Those agreeing with the proposition that nuclear weapons allow the US to spend less than otherwise would be necessary increased from 35 percent in 1993 to 39 percent in 1995 and 50 percent in our 1997 survey. Again, differences in means among the three public groups were all highly significant (1997 vs. 1995: $p < .0001$; 1997 vs. 1993: $p < .0001$; 1995 vs. 1993: $p = .0005$).

Our second question in this series asked respondents to rate the economic value of defense industry jobs and defense related technologies. Results are shown in Figures 3.11 and 3.12.

Figure 3.11

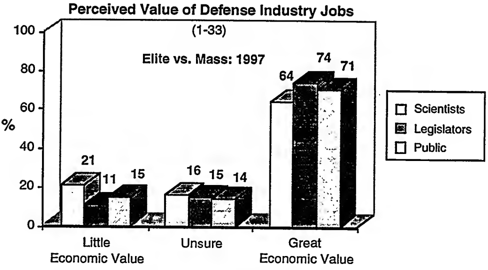
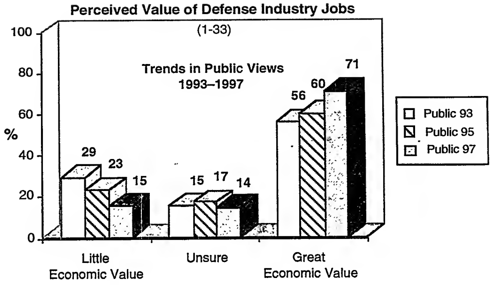


Figure 3.12

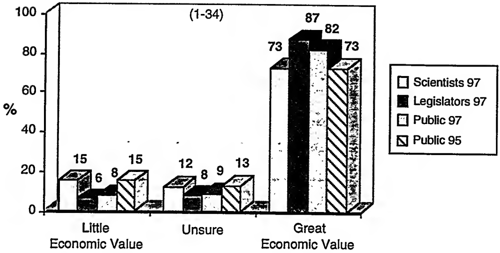


Large majorities of all three 1997 groups attached substantial economic value to defense industry jobs. Among the groups, differences were largest between legislators and scientists and between scientists and the public, both having a p-value <.0001. The difference in means between the legislator and public groups was not significant.

The trend over time in public perceptions of this issue indicated highly significant increases in the portion of respondents assigning substantial economic value to defense industry jobs. The trend grew from 56 percent in 1993 to 60 percent in 1995 (p =.0031) and 71 percent in 1997 (p <.0001). This trend may reflect public concerns about perceptions of military facility and personnel reductions associated with post-Cold War restructuring of US defense capabilities.

Our final question in this series asked for perceptions about the economic value of technological advances in defense industries for other areas of the US economy. Results are shown in Figure 3.13. Because this question was not asked of the general public in 1993, over time comparisons among public samples are limited to 1995 and 1997.

Figure 3.13 Perceived Value of Defense Technology Transfers

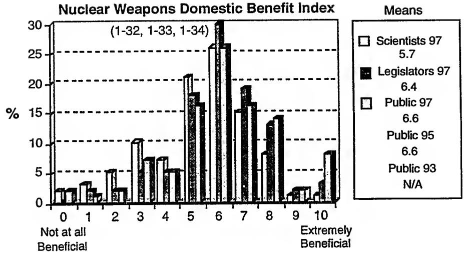


High economic value was perceived by large majorities of all groups to derive from defense technology transfers to other areas of the US economy. Differences in means between the legislator and scientist groups and between the public and scientist groups in 1997 both were highly significant ($p < .0001$), but the difference between the legislator and public groups was not statistically significant. Between 1995 and 1997, a significant increase of nine percent was reported among the general public who assigned important economic value to defense technology transfers ($p < .0001$).

Combined Index of Perceived Domestic Benefits

We combined responses to the above three questions about the cost-effectiveness of nuclear weapons for national defense, the benefits of defense related employment, and the economic value of defense related technologies to create an index of respondent perceptions of domestic benefits. As previously noted, this index is not limited to those investments and expenditures only associated with nuclear weapons. Nevertheless, it provides an indication of domestic valuation that can be used productively for trend analysis and in combination with measurements of external benefit perceptions. Distributions of the combined comparisons of domestic benefits reported in 1997 are shown for each of our three groups in Figure 3.14.

Figure 3.14



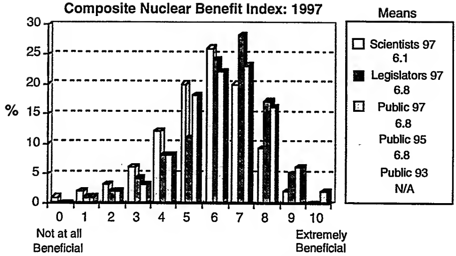
DomBen ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.1416	.8715	NA	NA

The modal response for all three groups was six, and the means varied from 5.7 to 6.6. Respondents from the legislator and general public groups perceived combined domestic benefits similarly, and the difference in means between the two was not statistically significant. However, combined perceptions among the scientist group were significantly below those of either the legislator or general public groups ($p < .0001$). Mean combined perceptions of the general public samples in 1997 were unchanged from those recorded two years earlier.

Section 3.4: Creating a Composite Nuclear Benefit Index

BY COMBINING THE EXTERNAL NUCLEAR BENEFIT INDEX (FIGURE 3.8) with the domestic nuclear benefit index (Figure 3.14), we created a composite nuclear weapons benefit index comparable to the nuclear weapons risk index, described in Chapter Two, Figure 2.23. Results are shown in Figure 3.15.

Figure 3.15



ComBen ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	.9392	.4483	NA	NA

Samples drawn from the general public in 1995 and 1997 and from state legislators in 1997 all report mean perceptions of combined external and domestic nuclear weapons risks at 6.8 on a zero to ten scale. Respondents from among the membership of American Men and Women of Science in 1997 registered a statistically significantly lower mean of 6.1.

Section 3.5: Summarizing Elite and Mass Perceptions of Benefits

AFTER THREE NATIONAL SURVEYS OF THE GENERAL PUBLIC AND comparative surveys of scientists and legislators, we have documented considerable evidence that the end of the Cold War and the demise of the Warsaw Pact and the Soviet Union has yet to bring about a drastic public devaluation of US nuclear weapons. Measures of the external benefits of nuclear weapons for maintaining US international influence and status and perceptions of the importance of the US remaining a military superpower have actually *increased* since 1993. When asked to relate the importance of US nuclear weapons to preserving the American way of life, respondents from the general public continued to indicate a strong valuation. Measures of the past and present importance of nuclear deterrence and its likely future effectiveness that we introduced in 1995 remained high in 1997, as did the combined external nuclear weapons benefit index.

Assessing perceptions of domestic benefits perceived to be associated with US nuclear weapons requires using indicators that are less direct than those used in measuring external nuclear weapons benefits. However, by employing inquiries about the cost effectiveness of US nuclear weapons and economic benefits perceived to derive from defense industry jobs and technology transfers, we were able to construct a combined measure that indirectly reflects on the issue of perceived domestic benefits. Among these measures, public perceptions of whether nuclear weapons allow the US to spend less for defense than would be necessary without nuclear capabilities have steadily increased since 1993, but perceptions among elites on this issue were much more equivocal, with scientists disagreeing with that assertion and state legislators divided approximately evenly. On the questions about the economic value of defense industry jobs and technology transfers, opinion was unambiguously strong among both elite and mass publics, and reflected a clearly increasing trend over time among the general public. When combined, these indirect indicators reflected a view of domestic benefits that has not appreciably declined since 1993.

When perceptions of external and domestic nuclear weapons benefits are combined into a composite nuclear benefits index, we find that perceptions among respondents from the general public remained steady at 6.8 (on a zero to ten scale) from 1995 to 1997. That level was also matched by participating legislators in 1997. However, the scientist group in 1997 perceived composite nuclear weapons benefits significantly lower at 6.1.

Having examined evolving perceptions of nuclear weapons risks in Chapter Two and nuclear weapons benefits in this chapter, we now turn to a wide variety of specific policy and spending preferences relating to strategic issues in Chapter Four. After examining individual issues and trends in perceptions about them, we will analyze relationships between a variety of issues and our four risk and benefit indices.

END NOTES

[1] Note that respondents from the legislator group rated the mean importance of nuclear deterrence higher on all three questions than did respondents from the other two groups. Given the potential for response bias discussed in Chapter One, the valuation of nuclear deterrence among the full population of state legislators could be expected to be somewhat lower.

[2] The potential for response bias discussed in Chapter One means that perceptions of nuclear weapons benefits among the full population of state legislators could be expected to be somewhat lower.

[3] See note 2.

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Chapter Four

Policy and Spending

Building on the preceding chapters that analyzed perceived risks and benefits of US nuclear weapons, this chapter assesses responses to specific questions about the viability and minimum size of the nuclear arsenal, support for strategic arms control initiatives, scientific cooperation to secure Russian nuclear assets, and preferences for how investments in US nuclear infrastructure should change. We then investigate relationships between the previously developed major nuclear weapons risk and benefit indices and key nuclear weapons policy and spending preferences. Throughout, we report information about these issues from our three 1997 respondent groups, and we compare trends among the general public over time.

Section 4.1: Viability and Size of the US Nuclear Arsenal

Debate about the future of nuclear weapons and prospects for their reduction or elimination has intensified since the end of the Cold War. A number of respected experts have suggested that the post-Cold War security environment provides an unprecedented opportunity to significantly reduce the levels of nuclear armaments or even to rid the world of all nuclear weapons.[1]

Since 1993 we have been asking a series of questions that are relevant to the debate about prospects for reducing or completely eliminating nuclear weapons. While they are not exhaustive of the ways in which this issue can and should be investigated, and we do not wish to represent them as definitive answers to public views about such a complex issue, we can offer them as indicators of some aspects of public deliberation on the complete elimination of all nuclear weapons.

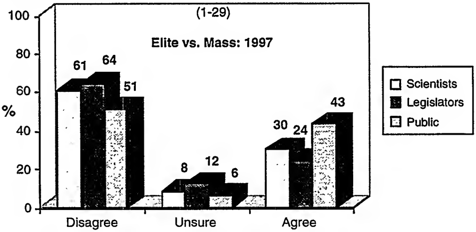
First, we asked participants to respond to the following two statements about the feasibility of eliminating nuclear weapons on a scale where one meant *strongly disagree,* and seven meant *strongly agree.*

- It is feasible to eliminate all nuclear weapons worldwide within the next 25 years. (1-29)

- Even if all the nuclear weapons could somehow be eliminated worldwide, it would be extremely difficult to keep other countries from building them again. (1-30)

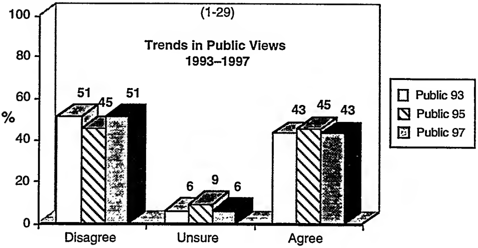
Responses comparing elite groups (scientists and legislators) with the general public group in 1997 are shown in Figures 4.1 and 4.3. Over time comparisons among respondents from the general public are displayed in Figures 4.2 and 4.4.

Figure 4.1 **Feasible to Eliminate All Nuclear Weapons in Next 25 Years**



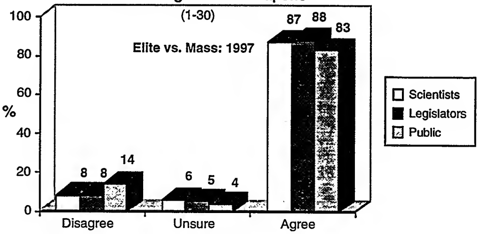
Note that a majority of all three groups considered it infeasible to eliminate all nuclear weapons worldwide within the next 25 years, but that both elite groups were more pessimistic about that possibility than was the general public group. Differences in means for both the scientist and state legislator groups compared to respondents from the general public were highly statistically significant (p <.0001 for each).

Figure 4.2 **Feasible to Eliminate All Nuclear Weapons in Next 25 Years**



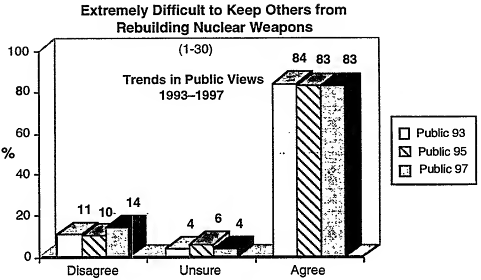
As shown in Figure 4.2, views among response groups from the general public have remained divided since 1993, with statistically insignificant changes registered in 1995.

Figure 4.3 **Extremely Difficult to Keep Others from Rebuilding Nuclear Weapons**



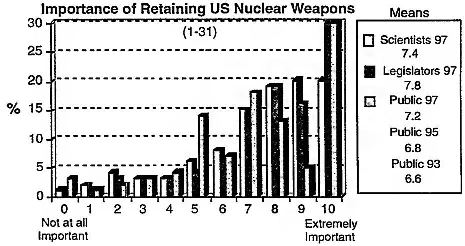
Very large majorities of each of the three 1997 groups were in agreement that if nuclear weapons were eventually to be eliminated, it would be extremely difficult to prevent others from rebuilding nuclear arsenals. As shown in Figure 4.4, this view has remained stable among the general public groups we surveyed since 1993.

Figure 4.4



Our third question in this series asked respondents how important it is for the US to retain nuclear weapons today. Answers were provided on a scale where zero meant *not at all important,* and ten meant *extremely important.* Distributions for the three 1997 groups are shown in Figure 4.5, and means are compared with respondents from the general public samples measured in 1993 and 1995.[2]

Figure 4.5



1-31 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0081	.0139	<.0001	<.0001	<.0001	.0708

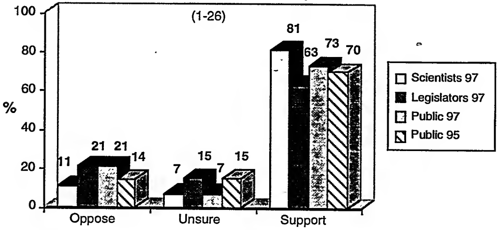
Several points should be noted. First, modal responses for scientist, legislator, and general public groups in 1997 were at the highest end of the scale. Second, means for all three 1997 groups were well above midscale. Third, the two elite groups rated the importance of retaining nuclear weapons today higher than did respondents from the general public. And fourth, public perceptions of the importance of retaining nuclear weapons increased significantly from 1993 to 1997 during a period in which, by many accounts, strategic nuclear threats from Russia were declining. While a downward trend in the perceived importance of US nuclear weapons was hypothesized, our results indicate the opposite, a trend in which the perceived importance of US nuclear weapons among respondents from the general public is increasing.

Nuclear Arms Control

If Americans are pessimistic about prospects for eliminating nuclear weapons, and if they think that US nuclear weapons should be retained for the present, does this mean that they are not supportive of arms control agreements designed to reduce and eventually to eliminate nuclear arms? To better understand US attitudes toward nuclear arms agreements, we asked three related questions, each of which was answered on a scale where one meant *strongly oppose,* and seven meant *strongly support.* The first asked respondents how they felt about the US participating in a treaty banning all nuclear test explosions. Grouped responses are provided in Figure 4.6. This question was first asked in 1995, so over time comparison is limited to two measurements.

Figure 4.6

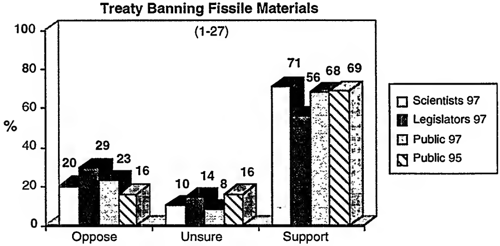
Treaty Banning All Nuclear Test Explosions



Strong majoritarian support was reported among all three 1997 groups and the 1995 general public sample. However, there were sizable differences in means among groups, with strongest support registered by scientists, and weakest support (though still very substantial) reported by participating state legislators. Differences in means between the two elite groups were highly statistically significant, as were differences between each of them and the general public group (all p-values <.0001). Views from the general public group in 1997 were not statistically significantly different from those reported in 1995. Though the Comprehensive Test Ban Treaty (CTBT) was not identified by name in the question, we clearly found strong support for a CTBT type agreement among all groups.

Our second question on arms control asked respondents how they felt about the US participating in a treaty that bans production of nuclear materials that could be used to make nuclear weapons. Again, strong support was found among all groups as shown in Figure 4.7.

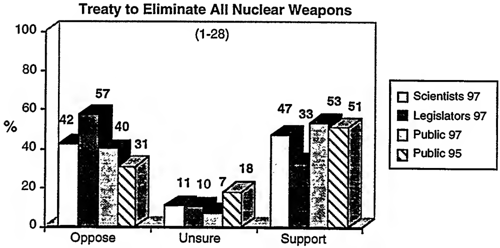
Figure 4.7



Here too, the legislator group was least supportive. Even though a majority of participating legislators indicated support for a fissile material cutoff type treaty, the mean for their group was statistically significantly lower than that of either the scientist group or those respondents from the general public (p <.0001 for both comparisons). Public support remained level from 1995 to 1997.

Our final question in this series asked participants how they felt about the US agreeing to a provision that requires us to eventually eliminate all US nuclear weapons. This question was within an implied framework of mutual arms reductions, and the results shown in Figure 4.8 should be viewed within that context.

Figure 4.8

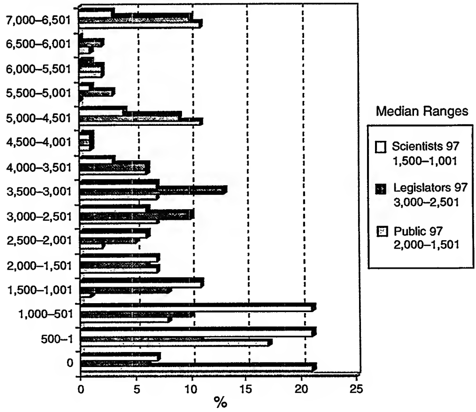


A treaty provision that would require the US to eliminate its nuclear arsenal received more equivocal support than did either the proposal for prohibiting nuclear testing or the production of fissile materials. Though a majority of respondents from the legislator group opposed US participation in an agreement requiring the elimination of all US nuclear weapons, we should note that because of the implications of response bias, noted in Chapter One, the full population of all state legislators would probably be somewhat less opposed to such a treaty. Support among scientist respondents was almost evenly split on this option. A bare majority of support for the measure was reported among the general public group, which was virtually the same as that found two years ago. When this finding is considered along with those previously reported in Figures 4.1–4.5, it seems apparent that substantial support existed for further reducing the numbers of US nuclear weapons, but far less support existed for completely eliminating them. However, skepticism about eliminating nuclear weapons does not necessarily equate to support for the status quo. In an effort to better understand public attitudes about how US nuclear capabilities might be restructured and to help answer the question of how many nuclear weapons might be perceived to be sufficient, we asked the following.

> Under the terms of arms reductions agreements, the US and Russia are reducing their stockpiles of nuclear weapons. Recent published reports estimate that the US and Russia each have about 7,000 strategic warheads deployed today. If mutual reductions in the number of US and Russian nuclear weapons are verifiable, to approximately what level would you be willing to reduce the number of US nuclear weapons? (1-23)

The distribution of responses and the median ranges for each respondent group are shown in Figure 4.9.

Figure 4.9 **Minimum Numbers of US Nuclear Weapons** (1-23)



How Low to Go?

In the context of an agreement between the US and Russia for mutual reductions in their nuclear arsenals, the legislator group reported a median range of 3,000–2,501 nuclear weapons, while the median range for respondents from the general public was 2,000–1,501 and the scientist group reported a median range of 1,500–1,001.[3] Twenty-one percent of the general public respondents were willing to reduce US nuclear weapons to zero, while only six percent of the state legislator group and seven percent of the scientist group were willing to completely eliminate the US nuclear arsenal. For majoritarian preferences, 55 percent of respondents from the general public were willing to reduce to a level of 2,000 or fewer nuclear weapons, while 56 percent of participating legislators were willing to reduce to 3,000 or fewer, and 60 percent of respondents from the members of American Men and Women of Science were willing to reduce to 1,500 or fewer.

Because this question was posed in the context of US-Russian mutual reductions, and because the number of Chinese nuclear weapons is generally thought to be much lower than those possessed by either the US or Russia, we also included two statements about the relationship of the Chinese nuclear arsenal to minimum acceptable levels of US nuclear weapons. Participants were asked to respond to the following statements on a scale where one meant *strongly disagree,* and seven meant *strongly agree.*

- The number of China's nuclear weapons should not influence the number of US nuclear weapons. (1-24)

- The US should not reduce below the number of nuclear weapons that China maintains. (1-25)

Results are charted in Figures 4.10 and 4.11.

Figure 4.10

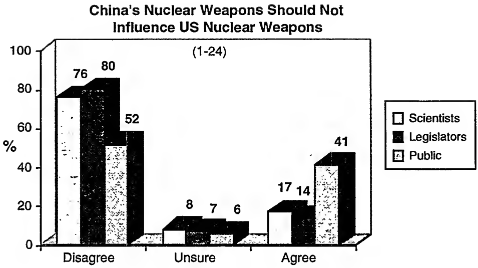
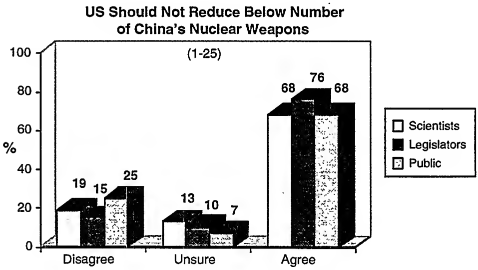


Figure 4.11



It seems apparent that each of our three groups perceived a relationship between the size of the Chinese nuclear arsenal and the minimum level to which they would be willing to reduce US nuclear weapons. In reaction to each of the two statements, the mean response from participating state legislators was statistically significantly higher than the mean of the other two groups.

Modernizing the Stockpile

What Constitutes a "New" Nuclear Weapon?

The US is not currently producing "new" nuclear weapons, but it is engaged in an active program of stockpile stewardship that includes a range of activities to insure the safety, reliability, and effectiveness of existing nuclear weapons. The distinction between what actions constitute enhancements to existing nuclear weapons capabilities and those that constitute "new" weapons capabilities may not always be clear. To gain a sense of how participants from the American Men and Women of Science perceived such technical issues, we asked a series of five questions designed to illuminate distinctions in this area. The questions were posed as follows:

> *Lead-in:* Under current national policy, the US does not produce new nuclear weapons. However, what constitutes a new nuclear weapon is not clearly specified. Using a scale where one means *definitely prohibit,* and seven means *definitely allow,* how do you think each of the following potential options should be treated?
>
> - Upgrading existing nuclear weapons safety features to reduce the likelihood of an accident (2-48)
> - Modernizing existing nuclear weapons electronics to assure continued reliability (2-47)
> - Upgrading nuclear weapons features to increase delivery accuracy (2-49)
> - Modifying existing nuclear weapons to be effective against new types of targets that weapons in the current stockpile cannot address (2-50)
> - Redesigning an existing weapon to provide a substantially different nuclear explosive yield (2-51)

Grouped responses to each are shown in Figures 4.12–16. (Note that all responses are from the scientist group; legislators and the general public were not asked these questions.)

Figure 4.12

Upgrading Existing Nuclear Weapons Safety Features to Reduce the Likelihood of an Accident?

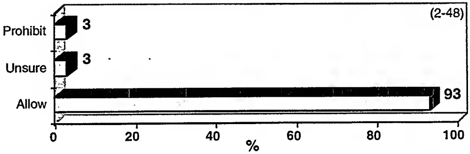


Figure 4.13

Modernizing Existing Nuclear Weapons Eectronics to Assure Continued Reliability?

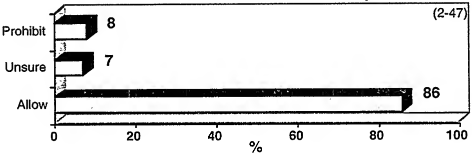


Figure 4.14

Upgrading Nuclear Weapons Features to Increase Delivery Accuracy?

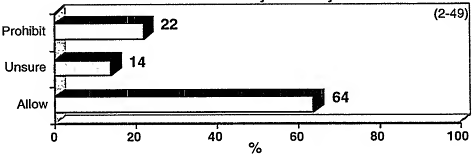


Figure 4.15 **Modifying Existing Nuclear Weapons to be Effective Against New Types of Targets that Weapons in the Current Stockpile Cannot Address?**

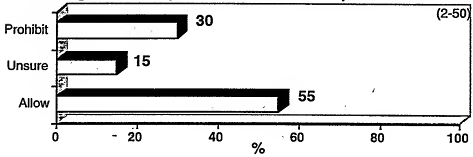
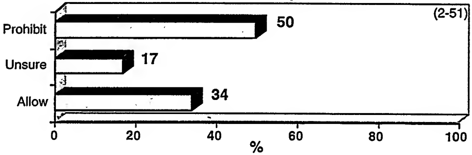


Figure 4.16 **Redesigning an Existing Weapon to Provide a Substantially Different Nuclear Explosive Yield?**



Participants from the American Men and Women of Science reported clear distinctions among the options presented, with very large majorities of 93 percent and 86 percent considering upgrading existing nuclear weapons safety features or electronics to be appropriate under existing policy. Smaller, but still sizable majorities of 64 percent and 55 percent also considered upgrades to increase delivery accuracy or to increase the effectiveness of existing weapons against different types of targets to be appropriate. However, only 34 percent of participating scientists thought that redesigning a weapon to provide a substantially different nuclear yield should be allowed under current policy.

Section 4.2: Preferences for Nuclear Investments

DATA PREVIOUSLY SHOWN SEEM TO INDICATE THAT MOST RESPONDENTS perceived considerable risks and benefits to be associated with the US nuclear arsenal and that they supported mutual Russian and US reductions in the numbers of nuclear weapons, but most were unwilling to reduce the US stockpile to levels below those of China or to zero. If respondents are making logical connections between the need for continuing some level of US nuclear weapons and the resources needed to do so, we should find those preferences reflected in views about spending on nuclear weapons capabilities. The next series of questions was designed to allow respondents to differentiate among several of the major investment categories involved in developing and sustaining the US nuclear arsenal. The series consisted of the following lead-in and five questions, each of which asked for preferences about how spending should *change* from current levels.

> *Lead-in:* Now we want your views about spending priorities. Please indicate how you think government spending on nuclear weapons should change in each of the following areas using a scale where one means spending should *substantially decrease,* and seven means spending should *substantially increase.*

- Developing and testing new nuclear weapons (1-35)
- Maintaining existing nuclear weapons in reliable condition (1-36)
- Research to increase the safety of existing nuclear weapons (1-37)
- Training to assure competence of those who manage US nuclear weapons (1-38)
- Maintaining the ability to develop and improve US nuclear weapons in the future (1-39)

Figure 4.17 **Spending for Developing and Testing New Nuclear Weapons**

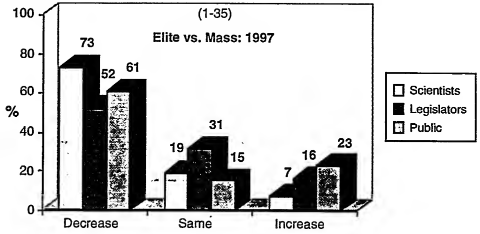
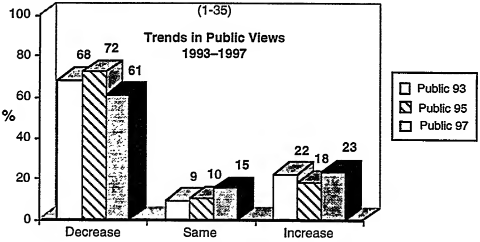


Figure 4.18 **Spending for Developing and Testing New Nuclear Weapons**



A majority among all three of the 1997 respondent groups preferred that spending for developing and testing nuclear weapons be reduced, though participating scientists favored that policy significantly more than the other two groups. Among respondents from the general public, the percent favoring a reduction in spending was statistically significantly lower than those preferring that policy in either 1993 or 1995 ($p < .0001$ for both comparisons).

Our next question asked participants how they thought spending should change for the purposes of maintaining existing nuclear weapons in reliable condition. This issue relates directly to public perceptions of the wide range of tasks often referred to as stockpile stewardship. Results are summarized in Figures 4.19 and 4.20.

Figure 4.19

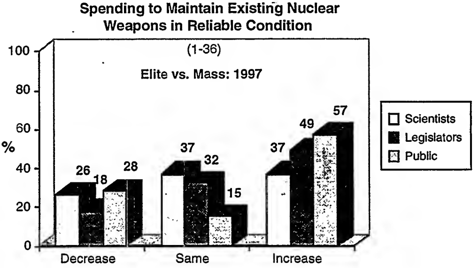
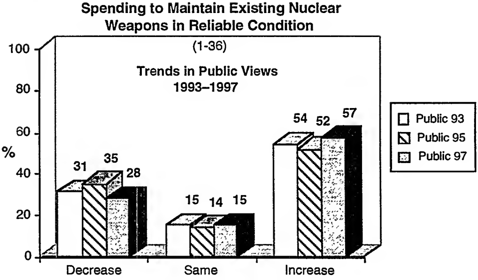


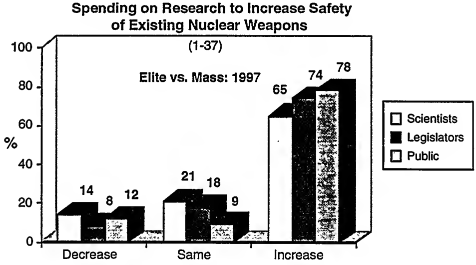
Figure 4.20



A majority of the general public group, a plurality of the legislator group, and more than one-third of the scientist group supported in creasing spending for maintaining the US nuclear stockpile. However, a comparison of means among the three indicated significantly different levels of support (legislators vs. public: p = .0154; legislators vs. scientists: p = .0004; and public vs. scientists: p <.0001). The mean level of support for increasing spending among the general public group in 1997 reflected a significant increase from that reported by the public in 1995 (p <.0001), but was not significantly higher than the mean level of support reported in 1993.

Next we examined preferences for spending on research to increase the safety of existing US nuclear weapons. As shown in Figure 4.21, wide support among all three groups for increasing investments in nuclear weapons safety was reported.

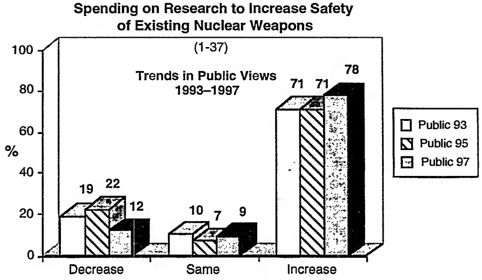
Figure 4.21



Intergroup differences in means were all highly statistically significant (p <.0001 for each paring). Fewer than 15 percent of any of the three groups thought that these types of investments should be reduced.

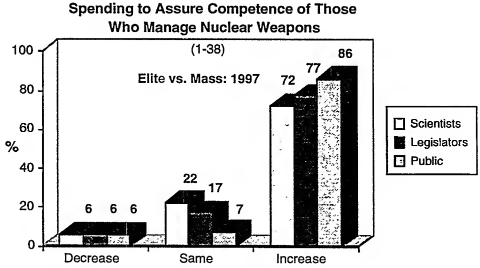
As shown in Figure 4.22, over time comparisons among respondents from the general public indicated that support for increasing investments in nuclear safety grew significantly in 1997 from the already high levels reported in 1993 and 1995 (p <.0001).

Figure 4.22



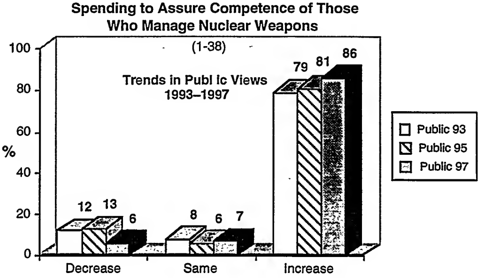
Our next inquiry was about spending preferences related to investments for training those who manage and control US nuclear weapons assets. Strong support for increasing spending in this category was reported by all three of the groups in 1997. However, mean responses from members of the two elite groups were significantly lower than those of respondents from the general public (scientists vs. public: $p < .0001$; legislators vs. public: $p < .0001$; scientists vs. legislators: $p = .0690$).

Figure 4.23



As shown in Figure 4.24, the trend in willingness among the general public to spend more for training those who maintain nuclear weapons shows a statistically significant increase in each of the measurement periods following our initial survey in 1993 (1993 vs. 1995: $p = .0307$; 1995 vs. 1997: $p = .0002$; 1993 vs. 1997: $p < .0001$).

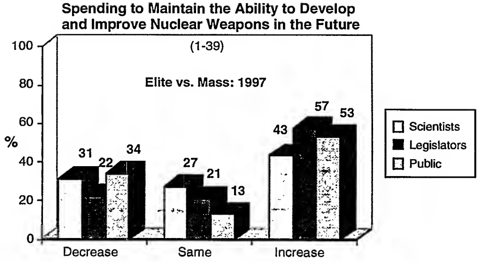
Figure 4.24



Our final category in this series asked respondents how they thought spending should change for maintaining the ability to develop and improve US nuclear weapons in the future. These kinds of investments pertain to sustaining the nuclear weapons infrastructure and indirectly reflect participants' expectations about the future necessity for nuclear weapons capabilities. As shown in Figure 4.25, a majority of the legislator and general public groups preferred increasing investments in this category, while opinion among participating scientists was somewhat more divided. Even though a plurality of scientist respondents preferred an increase in such funding, the mean for scientists was significantly below those for the other two groups ($p < .0001$ for both parings). The difference in means between the legislator and general public groups was not statistically significant.

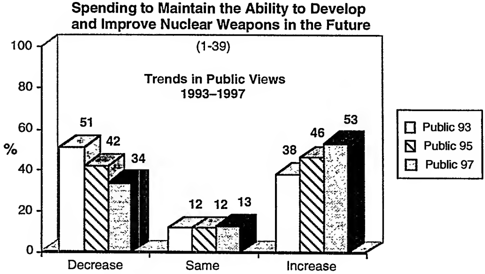
Investments in Nuclear Infrastructure

Figure 4.25



Views among the general public about investments in nuclear weapons infrastructure are particularly revealing, for they indicate a trend running counter to that expected. We hypothesized that public support for spending associated with maintaining the ability to develop and improve nuclear weapons in the future would decline as the post-Cold War era evolves. To date, we have documented a clear trend in the opposite direction. In 1993, only 38 percent of respondents from the general public indicated a willingness to increase such investments. Two years later, that measure increased significantly to 46 percent. And two years after that, our 1997 study reflected a 53 percent majority supporting an increase in such funding. Figure 4.26 illustrates the trend.

Figure 4.26



The increases in mean values over time were highly statistically significant (1993 vs. 1995: p <.0001; 1995 vs. 1997: p <.0001; 1993 vs. 1997: p <.0001). Note also that the percentage of respondents who were unsure or who favored no change remained steady, while the number of participants who thought spending should decrease declined proportionally to those favoring increases in each measurement period.

Our final categories in this series of measurements reflect respondents' preferences about how spending for preventing nuclear proliferation and nuclear terrorism should change. For both issues, large and growing percentages of respondents favored increasing funding. Intergroup and over time results of our inquiry about spending to prevent the further spread of nuclear weapons are shown in Figures 4.27 and 4.28, and corresponding measures of preferences about spending to prevent nuclear terrorism are shown in Figures 4.29 and 4.30.

Figure 4.27 **Spending to Prevent the Spread of Nuclear Weapons**

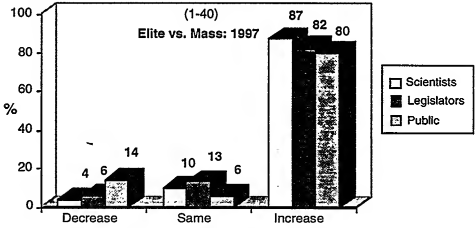


Figure 4.28

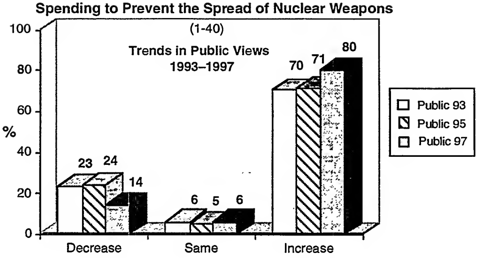


Figure 4.29

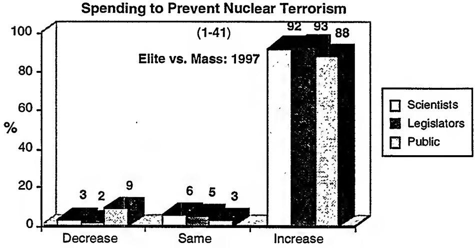
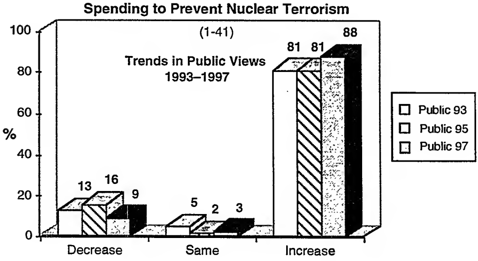


Figure 4.30



The extraordinarily large majorities of each of our 1997 groups and the growing majorities of respondents from the general public over time were consistent with the views of the threat posed by nuclear proliferation and nuclear terrorism discussed in Chapter Two and shown in Figures 2.11–13. In each of our three studies, we found sensitivity on the part of elite and mass publics to the threat of proliferation and terrorism and strong preferences for increasing spending for measures to prevent them.

Section 4.3: Perceptions About the US Nuclear Establishment

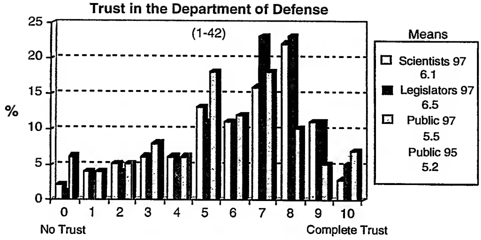
PUBLIC TRUST IS CRITICAL FOR DEVELOPING, SAFEGUARDING, AND managing nuclear assets. To help gauge relative levels of public trust in institutions that are important components of the US nuclear establishment, we asked participants in the 1995 and 1997 surveys to rate some of the most important communities that share responsibilities for key aspects of nuclear materials, processes, or weapons. The lead-in and inquiries were as follows.

> *Lead-In:* On a scale where zero means *no trust,* and ten means *complete trust,* how much do you trust the following organizations to safely manage nuclear resources such as nuclear weapons or radioactive materials?

- The Department of Defense (1-42)
- Public Utility companies (1-43)
- The Department of Energy (1-44)
- National laboratories (1-45)

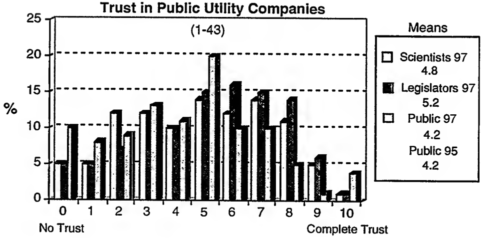
Responses to each are shown in Figures 4.31–34.

Figure 4.31



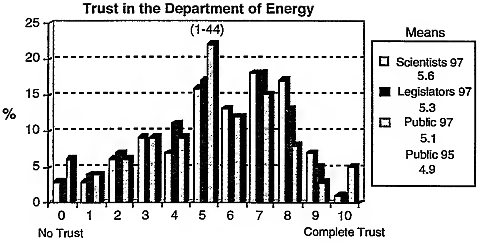
1-42 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0008	<.0001	<.0001	.0025	NA	NA

Figure 4.32



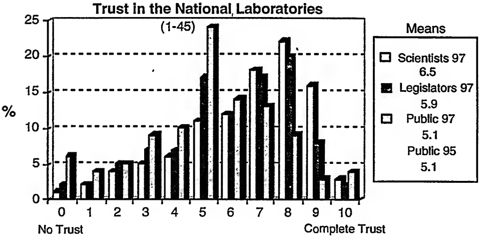
1-43 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0008	<.0001	<.0001	.9917	NA	NA

Figure 4.33



1-44 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	.0215	<.0001	.0885	.0238	NA	NA

Figure 4.34



1-45 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	<.0001	.9112	NA	NA

The lowest levels of trust for managing nuclear resources within each of the three 1997 groups were assigned to public utilities. Highest levels of trust among all groups were reported for the Department of Defense. The Department of Energy and US National Laboratories also were well ranked, with each group of respondents reporting mean values above midscale. Statistically significant increases in trust from 1995 to 1997 were registered among the general public for the Departments of Defense and Energy.

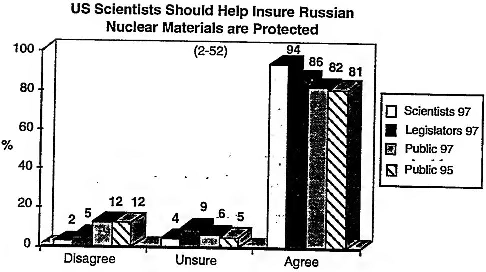
Section 4.4: US and Russian Scientific Cooperation

THE END OF THE COLD WAR BROUGHT NEW OPPORTUNITIES FOR US–Russia technical and scientific cooperation, and it brought new challenges and concerns about the safety and security of Russian nuclear assets. Among the initiatives begun were programs operating at multiple levels to encourage interaction between members of the US and Russian nuclear establishments. An active program of US–Russia lab-to-lab cooperation has focused on a better understanding of Russian nuclear management issues and carefully targeted support for enhancing the protection and security of Russian nuclear assets. In 1995 we began a series of questions to probe public understanding and support for such lab-to-lab efforts, and some of those questions were repeated in 1997. This section describes perceptions and preferences about US–Russia scientist-to-scientist interaction in the following three areas: securing Russian nuclear assets; dismantling Russian nuclear weapons; and converting Russian nuclear infrastructure to other types of production. For each policy area, participants were asked to respond to a statement about policy and a statement about related funding support using a scale where one meant *strongly disagree,* and seven meant *strongly agree.*

Securing Russian Nuclear Assets

Figure 4.35 shows grouped responses to the following statement: "US scientists should work with scientists in Russia to help insure that Russian nuclear materials are properly protected." (2-42)

Figure 4.35

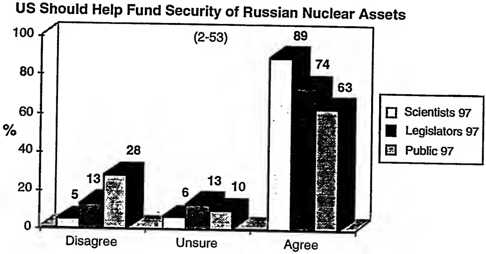


Large majorities exceeding 80 percent among all groups favored US scientists working with Russian scientists to help insure that Russian nuclear materials are properly protected. Public support held steady from 1995 to 1997.

Figure 4.36 provides grouped responses to the following statement:

> Even if the money is not repaid, the US should help fund improvements to the current security of Russian nuclear weapons and materials whose theft might pose a threat to the US. (2-53)

Figure 4.36

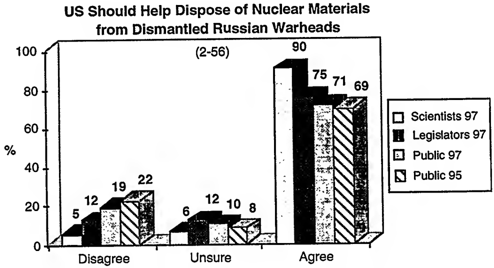


Majorities among all three 1997 groups supported US help to fund improved security of Russian nuclear assets that might pose a threat to the US, but the levels were lower than those for the preceding question. Also, wide differences in support among the three groups were noted (p <.0001 for each paring).

Dismantling Russian Nuclear Weapons

Figure 4.37 displays reactions to the following statement: "The US should help the Russians safely dispose of nuclear materials from dismantled Russian warheads." (2-56)

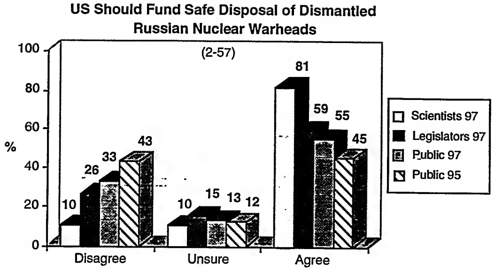
Figure 4.37



Here too, strong support among all responding groups was registered for assisting Russia in the safe disposal of their dismantled nuclear warheads. However, the scientist group was significantly more supportive of this option than the legislator or general public groups (p <.0001 for both parings). Sustained public support of about 70 percent was reported during the past two years.

We then asked participants to respond to the following statement: "The US should fund safe disposal of dismantled Russian warheads, even if the money is not repaid." (2-57) Results are shown in Figure 4.38.

Figure 4.38



On this issue, the scientist group was much more supportive than the other two groups (p <.0001 for both parings), but small majorities of both the legislator and general public groups favored US funding to help dispose of Russian nuclear warheads. There was a notably significant increase in public support for this policy option from 45 percent in 1995 to 55 percent in 1997 (p <.0001).

Converting Russian Nuclear Infrastructure

Our final inquiries regarding US–Russia technical cooperation addressed the issue of converting Russian nuclear weapons infrastructure to other purposes. Figures 4.39 and 4.40 report responses to the following statements:

- US scientists should work with scientists in Russia to help them move from nuclear weapons research into other areas of research. (2-54)

- The US should help pay to convert Russian nuclear weapons production facilities into those that produce other kinds of products. (2-55)

Figure 4.39

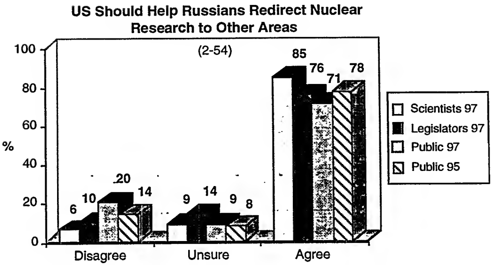
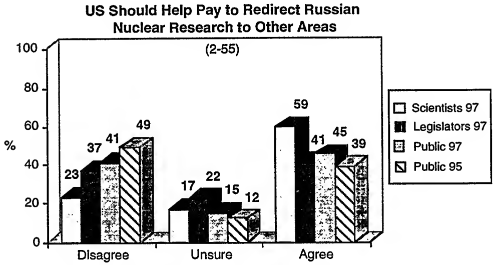


Figure 4.40



As seemed apparent with most of the other questions in this series, respondents from American Men and Women of Science were significantly more supportive than the other two 1997 groups ($p < .0001$ for both parings). Also similar to the others in this series, support among all groups dropped when the issue changed from US–Russian scientific cooperation to matters of funding. Respondents from all groups were less willing to help fund improvements to Russian nuclear infrastructure than they were to provide technical assistance. With one exception, support of participants from the general public held steady or increased during the past two years.

Section 4.5: Relating Perceptions of Risks and Benefits to Nuclear Weapons Policy and Spending

Having described in Chapters One and Two some of the ways in which members of elite and general publics perceived selected risks and benefits associated with nuclear weapons, and having presented a wide variety of nuclear weapons policy and spending preferences, we now examine how risk and benefit perceptions were related to policy and spending preferences.

Preparatory to presenting a summary of key relationships for multiple issues, it will be useful to illustrate the individual effects of each risk and benefit index on a single issue using bivariate regressions. Results will be compared to those found in 1995. Following the introductory examples, we will employ multiple regression methods to summarize the combined effects of the four risk/benefit indices on a variety of policy and spending issues.

Illustrating the Relationships of Key Indices to a Single Issue

To illustrate bivariate relationships of risk and benefit perceptions to individual issues, we used each of our four indices separately as an independent variable to predict change in the reported importance of retaining nuclear weapons. The dependent variable for each of these illustrations was question 1-31, which asked respondents to rate the importance of retaining nuclear weapons today using a scale where zero meant *not at all important,* and ten meant *extremely important.* Aggregate responses were previously reported in Figure 4.5.

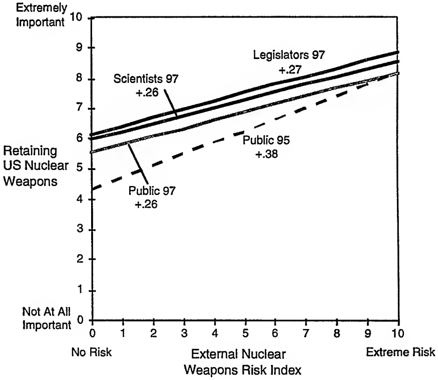
First, we used the external nuclear risk index constructed in Chapter Two (Figure 2.14) as the independent variable to predict the importance of retaining nuclear weapons (the dependent variable). Regression results are summarized in table 4.1.

Table 4.1 Relating External Risk Perceptions to the Importance of Retaining US Nuclear Weapons Today

External Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	5.95	+.26	5.95	<.0001	.03
Legislators 1997	6.14	+.27	4.65	<.0001	.03
Public 1997	5.55	+.26	6.83	<.0001	.03
Public 1995[4]	4.34	+.38	12.71	<.0001	.06

Results indicated that for each of the respondent groups, the external nuclear risk index was positively related to the issue of retaining nuclear weapons. Relationships were highly statistically significant within each group. Explanatory power was small, with variations in the external nuclear risk index accounting for about three percent of the overall variation in importance of retaining US nuclear weapons. Figure 4.41 graphs regression results.

Figure 4.41 External Nuclear Risk Index vs. the Importance of Retaining US Nuclear Weapons Today

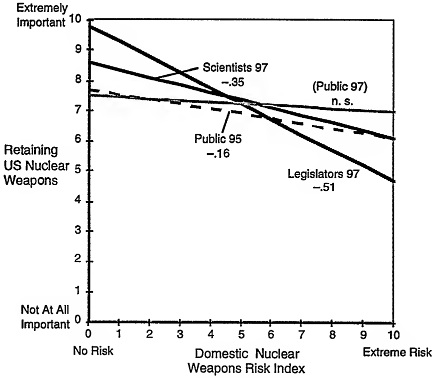


Next we used the domestic nuclear risk index as the independent variable to predict perceived importance of retaining US nuclear weapons. Regression results are summarized in Table 4.2 and graphed in Figure 4.42.

Table 4.2 Relating Domestic Risk Perceptions to the Importance of Retaining US Nuclear Weapons Today

Domestic Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	8.69	–.35	– 9.79	<.0001	.08
Legislators 1997	9.77	–.51	–12.25	<.0001	.21
Public 1997	(7.46)	(–.05)	(– 1.67)	(.0954)	(<.01)
Public 1995[5]	7.69	–.16	– 6.10	<.0001	.01

Figure 4.42 Domestic Nuclear Risk Index vs. the Importance of Retaining US Nuclear Weapons Today



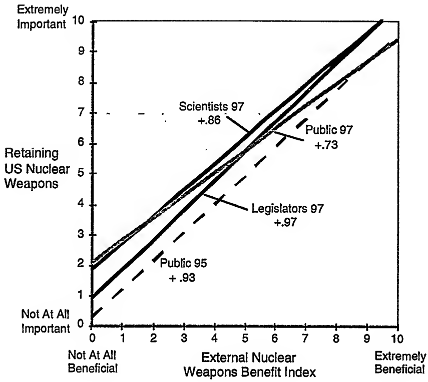
Compared to respondents from the general public in 1997 and 1995, risks perceived by the scientist and legislators groups to be associated with managing our own nuclear weapons were more strongly related to the importance of retaining US nuclear weapons. As perceptions of domestic nuclear risks increased one point among the scientist and legislator groups, the importance they assigned to retaining nuclear weapons decreased .35 and .51 points respectively. The domestic nuclear risk index explained eight percent of the variation in the dependent variable among scientists and 21 percent in the variation among state legislators. However, at the 95 percent confidence level, perceptions of domestic nuclear risks were not statistically significantly related to the importance of retaining nuclear weapons among the general public group in 1997 ($p = .0954$). Though a statistically significant relationship was reported by the general public group in 1995, perceptions of domestic nuclear risks explained only one percent of the variation in importance assigned to retaining nuclear weapons.

Now we turn our attention to the two nuclear weapons benefit indices. Bivariate relationships between the external nuclear benefit index and the importance of retaining nuclear weapons are presented for each respondent group in Table 4.3 and Figure 4.43.

Table 4.3 Relating External Nuclear Benefit Perceptions to the Importance of Retaining US Nuclear Weapons Today

External Nuclear Benefit Index	Intercept	Coefficient (Slope)	t-Value	p-Value	Adjusted R^2
Scientists 1997	1.88	+.86	34.76	<.0001	.52
Legislators 1997	.90	+.97	32.12	<.0001	.64
Public 1997	2.12	+.73	23.68	<.0001	.28
Public 1995[6]	.29	+.93	32.07	<.0001	.29

Figure 4.43 External Nuclear Benefit Index vs. the Importance of Retaining US Nuclear Weapons Today



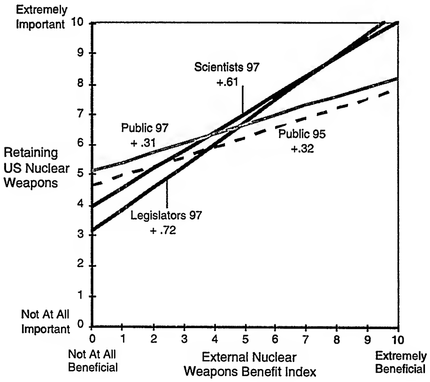
A strong and powerfully predictive relationship between the perceived benefits of US nuclear weapons for achieving US interests in the international environment and the importance of retaining US nuclear weapons was found among respondents from each group. The direction was positive in each case, and the coefficients produced steep regression lines, with unit movements approaching a one for one relationship. For example, among legislators, an increase of 1.0 on the external nuclear weapons benefit index resulted in an increase of .97 on the scale reflecting importance of retaining US nuclear weapons. For each group, the relationship between perceived nuclear weapons benefits and assessed importance of retaining nuclear weapons would have occurred by chance fewer than one in 10,000 times. Furthermore, the power of perceived benefits for explaining change in retention preferences varied from a low of 28 percent among the general public group in 1997 to a high of 64 percent among the legislator group.

Our final illustration uses the domestic nuclear benefits index to predict importance of retaining nuclear weapons. Regression results are summarized in Table 4.4 and graphed in Figure 4.44.

Table 4.4 Relating Domestic Nuclear Benefit Perceptions to the Importance of Retaining US Nuclear Weapons Today

Domestic Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	3.96	+.61	19.3	<.0001	.25
Legislators 1997	3.14	+.72	15.73	<.0001	.30
Public 1997	5.11	+.32	9.57	<.0001	.06
Public 1995[7]	4.64	+.32	12.81	<.0001	.06

Figure 4.44 Domestic Nuclear Benefit Index vs. Importance of Retaining US Nuclear Weapons Today



Here too, we found significant relationships. Perceptions of the economic and technological benefits of defense investments were positively related to perceptions of the importance of retaining US nuclear weapons within each of our respondent groups. The domestic benefit index was a strong predictor of retention valuation among the two elite groups, with coefficients of .61 for the scientist group and .72 for respondents from state legislatures, and explanatory values of 25 percent for scientists and 30 percent for legislators. Somewhat weaker relationships were found among the general public groups in 1997 and 1995, with coefficients of .32 for each group and modest R^2 values of six percent for each. Relationships for all four groups were highly statistically significant ($p < .0001$).

Relating Risk and Benefit Indices to Multiple Policy Preferences

The above examples use bivariate regression analysis to illustrate the separate relationships of each of our four risk and benefit indices to the reported importance of retaining nuclear weapons within each respondent group. Next we examine the combined effects of all four indices on a range of issues by using the four risk and benefit indices as independent variables in multiple regressions to predict variation in each of a dozen policy and spending preferences. Table 4.5 reports results for the scientist group. The number in each of the four columns of indices is the coefficient (slope) of the regression line for the associated issue. Each issue can be visualized as a regression line having the direction and slope of the coefficient shown. The statistical significance of each relationship is coded as follows: one asterisk indicates a p-value of .05 or less; two asterisks mean a p-value of .01 or less; and three asterisks represent a p-value of .001 or less. Relationships that are not statistically significant at the .05 level or below are indicated by the letters "n. s."

Table 4.5 Combined Effects of Risk and Benefit Perceptions on Policy and Spending Preferences Among Scientists (Multiple Regressions)

American Men and Women of Science 1997

Issue (Dependent Variable) p <.05* p <.01** p <.001***	External Risk Index	Domestic Risk Index	External Benefit Index	Domestic Benefit Index	Adj. R^2
1-31. Importance of retaining US nuclear weapons [1 = Not At All Important — 7 = Extremely Important]	+.11***	–.19***	+.71***	+.19***	.56
1-23. Minimum levels of US nuclear weapons [1 = 7,000–6,500 with decreasing increments of 500 to 15 = 0]	–.16*	n. s.	–.51***	–.31***	.20
1-26. Participating in a comprehensive test ban [1 = Strongly Oppose — 7 = Strongly Support]	–.11***	+.18***	–.20***	–.06*	.18
1-27. Participating in a fissile material cutoff [1 = Strongly Oppose — 7 = Strongly Support]	–.11**	+.29***	–.23***	–.07*	.21
1-28. Agreeing to eliminate US nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	–.16***	+.30***	–.42***	–.13***	.35
1-35. Funding for new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	+.09***	–.05**	+.24***	+.13***	.30
1-36. Funding to maintain reliable nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	+.13***	–.05*	+.24***	+.13***	.29
1-37. Funding to increase nuclear weapons safety [1 = Substantially Decrease — 7 = Substantially Increase]	+.07*	+.15***	+.18***	+.12***	.17
1-38. Funding to train nuclear weapons managers [1 = Substantially Decrease — 7 = Substantially Increase]	+.10***	+.12***	+.12***	+.09***	.14
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	+.07**	n. s.	+.32***	+.21***	.38
1-40. Funding to prevent nuclear proliferation [1 = Substantially Decrease — 7 = Substantially Increase]	+.08***	+.06**	n. s.	n. s.	.03
1-41. Funding to prevent nuclear terrorism [1 = Substantially Decrease — 7 = Substantially Increase]	+.14***	n. s.	+.05*	+.04*	.08

To illustrate interpretation, note issue number 1-28. The policy question asked respondents how they felt about the US agreeing to a provision that would require the US eventually to eliminate all of our nuclear weapons. It was answered on a scale where one meant respondents *strongly opposed* such a provision, and seven meant they *strongly supported* that policy. As previously described in Chapter Two, the external nuclear risk index expresses combined responses to six individual risk questions on a scale where zero represented *no risk,* and ten represented *extreme risk.* Results show that as perceptions of external nuclear risks from others' nuclear weapons increased one point, support for an agreement requiring the US to eliminate all its nuclear weapons decreased .16 points. Continuing to the other indices, as the domestic nuclear risk index increased one point, support for eliminating US nuclear weapons increased .30 points. For each increase of one point in the external benefit index, support for eliminating US nuclear weapons decreased .42 points. Finally, as the domestic benefits index increased one point, support for eliminating US nuclear weapons declined .13 points. All four relationships were highly statistically significant. Together, the four indices accounted for 35 percent of the variation in answers to the issue question. These findings and the other relationships illustrated here show that among our scientist group, the four nuclear weapons risk and benefit indices were systematically related to a variety of policy and spending preferences.

Tables 4.6 and 4.7 summarize multiple regression results for the state legislator group and the general public group using our risk and benefit indices to predict the same policy and spending issues illustrated above.

Table 4.6 Combined Effects of Risk and Benefit Perceptions on Policy and Spending Preferences Among Legislators (Multiple Regressions)

State Legislators 1997

ISSUE (DEPENDENT VARIABLE) $p < .05^{*}$ $p < .01^{**}$ $p < .001^{***}$	EXTERNAL RISK INDEX	DOMESTIC RISK INDEX	EXTERNAL BENEFIT INDEX	DOMESTIC BENEFIT INDEX	ADJ. R^2
1-31. Importance of retaining US nuclear weapons [1 = Not At All Important — 7 = Extremely Important]	+.07*	–.24***	+.77***	+.19***	.69
1-23. Minimum levels of US nuclear weapons [1 = 7,000–6,500 with decreasing increments of 500 to 15 = 0]	–.21*	n. s.	–.84***	–.28**	.25
1-26. Participating in a comprehensive test ban [1 = Strongly Oppose — 7 = Strongly Support]	–.11*	+.27***	–.29***	n. s.	.25
1-27. Participating in a fissile material cutoff [1 = Strongly Oppose — 7 = Strongly Support]	–.15**	+.35***	–.27***	n. s.	.30
1-28. Agreeing to eliminate US nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	–.13**	+.40***	–.45***	n. s.	.46
1-35. Funding for new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	+.11***	n. s.	+.32***	+.10**	.36
1-36. Funding to maintain reliable nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	+.08**	–.08***	+.29***	+.11***	.33
1-37. Funding to increase nuclear weapons safety [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	+.14***	+.17***	+.10**	.11
1-38. Funding to train nuclear weapons managers [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	+.14***	+.14***	+.12***	.11
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	+.09**	–.07***	+.41***	+.15***	.47
1-40. Funding to prevent nuclear proliferation [1 = Substantially Decrease — 7 = Substantially Increase]	+.09*	+.07*	n. s.	n. s.	.02
1-41. Funding to prevent nuclear terrorism [1 = Substantially Decrease — 7 = Substantially Increase]	+.13***	+.05*	+.10***	n. s.	.10

Table 4.7 Combined Effects of Risk and Benefit Perceptions on Policy and Spending Preferences Among the Public (Multiple Regressions)

General Public 1997					
ISSUE (DEPENDENT VARIABLE) p <.05* p <.01** p <.001***	EXTERNAL RISK INDEX	DOMESTIC RISK INDEX	EXTERNAL BENEFIT INDEX	DOMESTIC BENEFIT INDEX	ADJ. R^2
1-31. Importance of retaining US nuclear weapons [1 = Not At All Important — 7 = Extremely Important]	+.13***	–.13***	+.67***	+.13***	.30
1-23. Minimum levels of US nuclear weapons [1 = 7,000–6,500 with decreasing increments of 500 to 15 = 0]	n. s.	n. s.	–.59***	n. s.	.07
1-26. Participating in a comprehensive test ban [1 = Strongly Oppose — 7 = Strongly Support]	n. s.	+.10***	–.16***	n. s.	.02
1-27. Participating in a fissile material cutoff [1 = Strongly Oppose — 7 = Strongly Support]	n. s.	+.13***	–.15***	n. s.	.03
1-28. Agreeing to eliminate US nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	–.13***	+.31***	–.31***	n. s.	.12
1-35. Funding for new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	–.05*	+.28***	+.13***	.14
1-36. Funding to maintain reliable nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	+.08**	–.06**	+.31***	+.13***	.15
1-37. Funding to increase nuclear weapons safety [1 = Substantially Decrease— 7 = Substantially Increase]	n. s.	+.10***	+.20***	+.13***	.11
1-38. Funding to train nuclear weapons managers [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	+.05*	+.08***	+.13***	.06
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	n. s.	+.41***	+.14***	.19
1-40. Funding to prevent nuclear proliferation [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	n. s.	+.09*	+.06*	.02
1-41. Funding to prevent nuclear terrorism [1 = Substantially Decrease — 7 = Substantially Increase]	n. s.	n. s.	+.11***	+.07**	.03

Again, systematic relationships were evident among both the legislator and general public groups between risk and benefit perceptions and preferences for policy and spending on related issues. However, note that fewer statistically significant relationships existed among the state legislator group than among the scientist group, and fewer significant relationships existed among the general public group than among either legislators or scientists. This implies that respondents' technical knowledge and expertise about nuclear weapons issues may have influenced the degree to which individuals made systematic connections between perceptions of risks and benefits and associated policy options.

Section 4.6: Summarizing Policy and Spending Implications

Sizing the Stockpile

SCIENTIST, LEGISLATOR, AND GENERAL PUBLIC GROUPS WERE SKEPTICAL about the feasibility of completely eliminating nuclear weapons, but they were supportive of further reducing nuclear armaments. However a majority of each group considered it important to carefully consider Chinese as well as Russian nuclear capabilities in determining the extent to which the US should denuclearize. All three groups placed considerable importance on retaining some level of US nuclear weapons at the present time. Trends among the general public regarding denuclearization were generally stable from 1995 to 1997. When asked to what minimum levels the US could safely reduce its nuclear stockpile (in the context of mutual arms reductions), the median range preferred by members of American Men and Women of Science was 1,000 to 1,500. For the state legislator group, a higher median range of 2,500 to 3,000 was preferred. Respondents from the general public took a middle position, advocating a median range of 1,500 to 2,000.

Preferences were reported among each of the three 1997 groups for decreasing investments in developing and testing new nuclear weapons. However, sizable support among the three groups was registered for increasing funding for each of the following: (1) maintaining existing nuclear weapons in reliable condition; (2) increasing the safety of existing nuclear weapons; (3) training those who manage nuclear weapons; and (4) maintaining the nuclear infrastructure needed to develop and improve nuclear weapons in the future. Clear trends from 1993 to 1997 were evident among respondents from the general public for increasing investments in some of these categories. For example, preferences for increasing spending for training increased from 79 percent in 1993 to 81 percent in 1995 to 86 percent in 1997. An even clearer trend appeared among the general public groups regarding increasing spending to maintain the ability to develop and improve nuclear weapons in the future, with only 38 percent supporting increased funding in 1993, 46 percent in 1995, and a 53 percent majority preferring to increase such investments in 1997.

Investment Preferences

Very large majorities representing strong consensus among all three groups thought that spending for preventing nuclear proliferation and nuclear terrorism should be increased, and the trend since 1993 among general public groups was toward increasing support.

Assisting Russia

We also found strong support among all respondent groups for providing technical assistance to help insure that Russian nuclear materials are protected, that nuclear materials from dismantled Russian warheads are safely disposed, and that Russian nuclear weapons research is redirected to other areas. Less (though still substantial) support was reported for helping to fund initiatives to achieve all three objectives. Across the board, support for providing technical assistance and helping to fund improvements in Russia was stronger within the scientist group than among the legislator and general public groups. Agreement was strongest across all three groups for helping to insure that Russian nuclear assets are adequately secured.

We found risk and benefit perceptions among all three groups to be systematically related to policy and spending issues whether examined using bivariate or multivariate regression analyses. Relationships were found to be stronger and more consistent among elites (especially scientists) than among the general public. This implies that technical understanding may have contributed to the degree to which policy rele-

Relating Risks and Benefits to Policy & Spending

vant connections were made between risk and benefit perceptions and nuclear weapons policy options and spending priorities. Nevertheless, we found ample evidence that multiple publics, including the lay public, made systematic connections between perceptions of external and domestic nuclear weapons risks and benefits and their implications for nuclear weapons policy choices and investment strategies. Our findings support the contention that American citizens, with or without specialized expertise in technical matters, are quite capable of contributing to the debate about the evolving nature of US nuclear security policy in the post-Cold War environment.

Next, in Chapters Five and Six, we turn to the implications of demographics and belief systems for nuclear weapons related policy preferences and investment priorities.

End Notes

[1] The debate about how to restructure nuclear forces after the Cold War is very large and varied. Only a few key references will be cited here. For cogent arguments for reductions to much lower levels of nuclear weapons see (among others): (1) Graham Allison, Ashton B. Carter, Steven E. Miller, and Philip Zelikow, eds, 1993, *Cooperative Denuclearization: From Pledges to Deeds,* Cambridge, MA: Center for Science and International Affairs, Harvard University; (2) McGeorge Bundy, William J. Crowe, Jr., and Sidney D. Drell, 1993, *Reducing Nuclear Danger: The Road Away from the Brink,* New York: Council on Foreign Relations; (3) Michèle A. Flournoy, 1993, *Nuclear Weapons After the Cold War: Guidelines for U.S. Policy,* New York: HarperCollins. For international perspectives for eliminating nuclear weapons see (among others): (1) Joseph Rotblat, Jack Steinberger, and Bhalchandra Udgaonkar, eds., and Frank Blackaby, exec. ed., 1993, *A Nuclear-Weapon-Free World: Desirable? Feasible?* Boulder, CO: Westview Press; (2) Canberra Commission on the Elimination of Nuclear Weapons, 1996, *Report of the Canberra Commission on the Elimination of Nuclear Weapons,* Canberra, Australia: Commonwealth of Australia; (3) Steering Committee, 1997, *An American Legacy: Building a Nuclear-Weapon-Free World,* Washington: The Henry L. Stimson Center. For a recent prescription for future US nuclear security policy, see Committee on International Security and Arms Control, National Academy of Sciences, 1997, *The Future of U.S. Nuclear Weapons Policy,* Washington: National Academy Press.

[2] The 1–7 response scale used in 1993 and 1995 for expressing the importance of retaining US nuclear weapons was converted to 0–10 for these comparisons.

[3] The potential for response bias among the state legislator group discussed in Chapter One would seem to imply that the minimum number of US nuclear warheads acceptable to the population of all state legislators might be somewhat lower than that reported by our respondents. However, the median range among the 69 legislator nonrespondents to the mail survey who answered a shorter set of questions by telephone in our follow-up survey was actually higher at 3,500–3,001.

[4] The 1–7 response scale used in 1995 for expressing the importance of retaining US nuclear weapons was converted to 0–10 for these comparisons.

[5] See note 4.

[6] See note 4.

[7] See note 4.

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Chapter Five

Demographic Implications

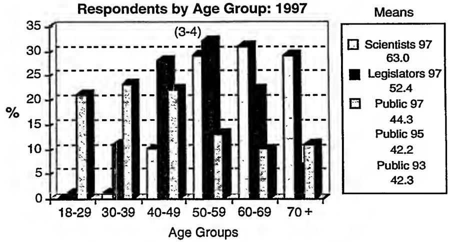
OUR DATA INDICATE THAT AT THE INDIVIDUAL LEVEL OF ANALYSIS, demographic factors and belief systems are related in subtle but important ways to perceptions and policy preferences about security. In this chapter we examine the relationships of selected demographic characteristics to perceptions of nuclear weapons risks and benefits and to related policy and spending preferences. In the following chapter we investigate the implications of individual belief systems for views about nuclear security. Demographics and beliefs are among those variables depicted in the center of the analytic framework presented in Chapter One, Figure 1.1, and they represent individual attributes that act as cognitive molds limiting and shaping the ways that we perceive, process, and interpret information about nuclear security. Specifically, we examine the implications of age, gender, education, income, and geographic region on views of nuclear weapons risks, benefits, and policies.

Section 5.1: Relating Age to Views about Nuclear Security

Age Characteristics

AS NOTED IN CHAPTER ONE, MEMBERSHIP IN AMERICAN MEN AND Women of Science is based on scientific accomplishment, and therefore members are more senior than either of our other groups. Respondents in the scientist group ranged from 35 to 91 years of age, with the average age being 63.0. The ages of participating state legislators varied from 22 to 82, with the mean age being 52.4 years. Because we limited our samples to those 18 years of age and older, respondents from the general public were between the ages of 18 and 100, and the general public group averaged 44.3 years of age. Figure 5.1 shows the distribution of each respondent group by age category.

Figure 5.1

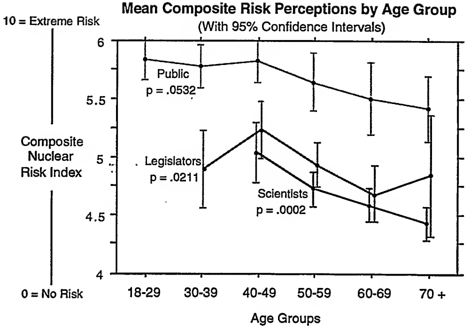


Substantial differences are evident in the distributions of age categories, with two-thirds of respondents from the general public being below the age of fifty, and 60 percent of participating legislators and 89 percent of participating scientists being above the age of fifty. On average, participants from American Men and Women of Science were about a decade older than members of the legislator group, and the legislators were about 12 years older than respondents from the general population.

Age vs. Perceptions of Nuclear Weapons Risks

To determine relationships between respondent age and perceptions of risks associated with nuclear weapons, we employed two methods: cohort comparisons and regression analysis. In the first, we compared risk perceptions among different age groups using analysis of variance to examine differences in mean risk perceptions represented by the composite nuclear weapons risk index described in Chapter Two, Figure 2.23. Results are shown in Figure 5.2. Mean risk perceptions per age group for each of the three 1997 respondent categories are shown with 95 percent confidence bars.

Figure 5.2



The few legislators under the age of 30 were combined with the 30–39 age group. Perceptions of risk as measured by the composite nuclear weapons risk index increased from the youngest age group to the 40–49 age group, then declined with increasing age beyond that point. The increase in risk perceptions by those legislators over 70 years of age reflects a very small number of respondents (33) in that category.

Too few respondents from American Men and Women of Science were under the age of 40 to constitute separate age groups, so they were combined with the 40-49 age group. As age increased among participating scientists, risk perceptions decreased.

Among respondents from the general public, composite perceptions of nuclear weapons risks declined after reaching the 40-49 age group. Overall p-values for each group were statistically significant.

Additionally, we used age as an independent variable in a bivariate regression to predict the composite nuclear weapons risk index. As shown in Table 5.1, regression results are very similar among all three respondent groups. A statistically significant but predictively weak relationship was found in each group between respondent age and combined perceptions of external and domestic nuclear weapons risks. With each additional year of age, perceptions of risks among scientist respondents decreased by 0.02 on a scale where zero meant no risk, and ten meant extreme risk. Among the legislator and general public groups, perceptions of risks declined 0.01 for each additional year of age.

Table 5.1 Relating Age to Composite Nuclear Weapons Risk Perceptions
(Bivariate Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	5.71	–.02	–4.46	<.0001	.02
Legislators 1997	5.55	–.01	–2.16	.0314	.01
Public 1997	6.08	–.01	–3.12	.0019	.01

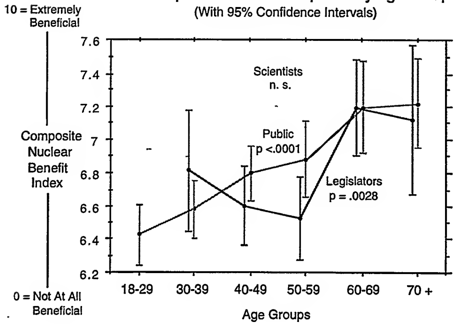
In summary, whether analyzed by differences of means among age groups or in bivariate regressions where age was used to predict risk perceptions, advancing age resulted in slightly lower perceptions of combined nuclear weapons risks. The effects were similar across both elite groups and the general public group.

Age vs. Perceptions of Nuclear Weapons Benefits

Using the same two techniques, we examined the relationships between respondent age and perceptions of external and domestic benefits as represented by the composite nuclear weapons benefit index described in Chapter Three, Figure 3.15. Results of the analysis of variance among mean benefit perceptions by age group are presented in Figure 5.3.

Figure 5.3 **Mean Composite Benefit Perceptions by Age Group**

(With 95% Confidence Intervals)



Among respondents from the general public, a clear and highly significant relationship was found, with combined perceptions of external and domestic nuclear weapons benefits increasing with each cohort group from the youngest to the oldest. The legislator group also reflected a general upward trend in benefit perceptions with age group, from approximately the same starting and ending points as the general public group, but with more variation. A comparison of means in composite benefit perceptions among the scientist group did not reveal statistically significant differences based on age.

Next we used respondent age as the independent variable in a bivariate regression to predict combined perceptions of external and domestic nuclear weapons benefits. Results are summarized in Table 5.2.

Table 5.2 Relating Age to Composite Nuclear Weapons Benefit Perceptions (Bivariate Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Legislators 1997	5.82	.02	2.90	.0039	.01
Public 1997	6.04	.02	6.38	<.0001	.03

Relationships between age and perceived benefits associated with US nuclear weapons among both the state legislator group and the general public group were statistically significant, but they had weak explanatory power. The relationship of age to perceived composite benefits was not statistically significant among scientist respondents.

Relating Age to the Valuation of Nuclear Deterrence

Among the questions incorporated in the above composite nuclear weapons benefit index were two that asked respondents to rate the importance of nuclear deterrence during the Cold War and the importance of nuclear deterrence today. A third question asked participants to estimate the future effectiveness of nuclear deterrence if more countries acquire nuclear weapons. Responses were previously reported in Chapter Three, Figures 3.5–3.7. The relationship between age and the perceived risks and benefits of our nuclear arsenal could be explained either as an effect of individual aging (getting older may lead one to view nuclear risks and benefits differently) or of cohort effect (shared experiences of a particular age group that make their views of nuclear risks and benefits unique). It is the latter possibility that may have greatest implications for US nuclear security policy, for if younger citizens who did not experience the Cold War see significantly greater risks and smaller benefits from our nuclear arsenal, they could be expected to carry those views forward and to base future policy preferences on them.

Because of the potential implications of the way nuclear deterrence is valued in future debates about nuclear weapons, we examined the three questions about deterrence separately to see if age was importantly related. Our interests centered around the hypothesis that having experienced the nuclear standoff of the Cold War may influence the valuation of nuclear weapons for deterrence purposes, and that as more members of the public who did not experience the Cold War reach maturity, the perceived value of nuclear deterrence may change. Such a change might have important implications in future discussions about nuclear force structure and in debates about eliminating nuclear weapons.

The three deterrence questions were not asked prior to 1995, and a relatively short period of time has elapsed since the end of the Cold War, so we were unable to fully test the hypothesis. However, we were able to examine the relationship of respondent age to valuation of nuclear deterrence separately from other components of the composite benefit index. Results of cohort analysis are shown for each of the deterrence questions in Figures 5.4–5.6, and bivariate regression results using age as a continuous independent variable to predict deterrence valuation for each are summarized in Tables 5.3–5.5.

Figure 5.4

Mean Importance of Nuclear Deterrence During the Cold War by Age Group
(With 95% Confidence Intervals)

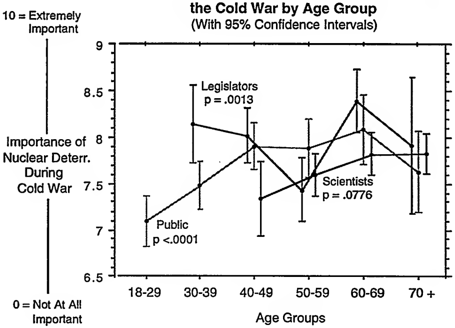


Table 5.3 Relating Age to Importance of Nuclear Deterrence During Cold War
(Bivariate Regressions)

Importance of Nuc. Deter. in Cold War	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	6.85	+.01	2.33	.0202	<.01
Legislators 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Public 1997	6.97	+.01	3.86	.0001	.01

Figure 5.5

Mean Importance of Nuclear Deterrence Today by Age Group (With 95% Confidence Intervals)

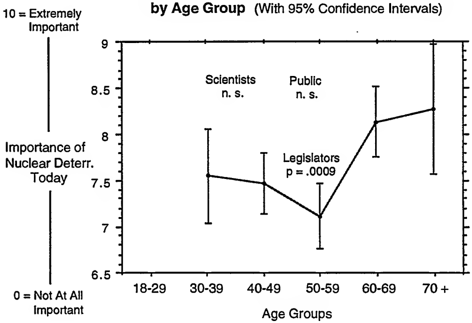


Table 5.4 Relating Age to Importance of Nuclear Deterrence Today
(Bivariate Regressions)

Importance of Nuc. Deterrence Today	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	6.28	+.01	1.91	.0567	<.01
Legislators 1997	6.17	+.03	3.06	.0023	.01
Public 1997	6.99	+.01	2.35	.0187	<.01

Figure 5.6 **Mean Future Effectiveness of Nuclear Deterrence by Age Group** (With 95% Confidence Intervals)

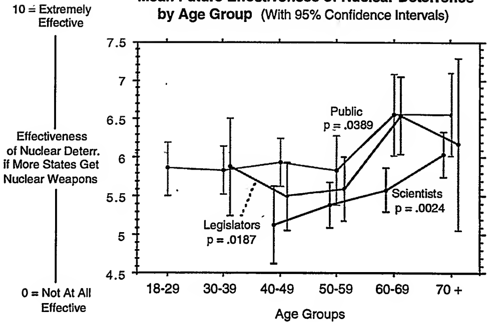


Table 5.5 Relating Age to Future Effectiveness of Nuclear Deterrence if More States Acquire Nuclear Weapons (Bivariate Regressions)

Future Effec. of Nuc. Deterrence	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	3.72	+.03	4.04	<.0001	.01
Legislators 1997	4.25	+.03	2.87	.0043	.01
Public 1997	5.38	+.01	2.88	.0041	.01

Whether examined in terms of differences in mean valuations of past, present, or future deterrence by age group, or as results of bivariate regressions using age as a continuous independent variable to predict deterrence valuation, these data reflect a statistically significant but predictively weak relationship between age and views of the importance and effectiveness of nuclear deterrence. We found a tendency for the valuation of nuclear deterrence to increase slightly with age among all three respondent groups.

We performed two additional tests that provide tentative information about how respondents who had reached the age of 18 since the end of the Cold War valued nuclear deterrence. Using the dissolution of the Soviet Union in 1991 as the benchmark for the end of the Cold War, those individuals who were ages 14–17 in 1991 had reached ages 18–21 when we first asked the series of three questions on nuclear deterrence in 1995. First we compared responses of those between the ages of 18 and 21 in 1995 with those of the same age group in 1997 (who were ages 12–15 in 1991 when the Cold War ended). We found that differences among mean responses to our three nuclear deterrence valuation questions were not statistically significant between those 18–21 years of age in 1995 vs. those 18–21 years of age in 1997. Second, we compared those who were 18–21 years old in 1995 with those who were 20–23 years old in 1997, and again mean responses to our three nuclear deterrence questions were not significantly different.

No Cold War Experience

These data are preliminary and do not definitively test the hypothesis. It is too early in the post-Cold War era to predict whether members of elite and mass publics who did not experience the Cold War will view nuclear deterrence differently than those who personally experienced the Cold War. However, because our data revealed a small but identifiable tendency for the valuation of nuclear deterrence to increase with age, and because it is too soon to fully evaluate the implications of not personally experiencing the Cold War on deterrence valuation, we suggest that understanding how nuclear deterrence is perceived and valued in future years will require considering the implications both of age and the post-Cold War security environment.

Age and Policy and Spending Preferences

Using bivariate regressions, we found several systematic relationships between age and policy and spending preferences that were consistent across different types of respondent groups. But for some other issues, such as participating in a comprehensive test ban or a fissile material cutoff treaty, age was not a reliable predictor of preferences. We found age to be a weak predictor of support for further reducing the US nuclear stockpile, with willingness to reduce to the lowest levels decreasing with age among the general public, but not within all the elite groups. Table 5.6 summarizes relationships between age and six issues relating to sustaining and managing the US nuclear stockpile.

Table 5.6 Relating Age to Nuclear Weapons Policy Preferences
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Scientists 97	Legislators 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
1-3. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]						
+.02**	+.02*	+.02***	+.03***	+.03***	n. s.	+.02***
1-35. Funding for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
+.01***	n. s.	+.01**	n. s.	+.02***	n. s.	+.01*
1-36. Funding to maintain reliable nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
+.01*	n. s.	n. s.	+.01**	+.01*	–.01*	n. s.
1-37. Funding to increase safety of nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	+.01*	n. s.	n. s.	n. s.	n. s.	n. s.
1-38. Funding to train those managing nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
+.01*	+.02***	n. s.	n. s.	n. s.	+.01*	n. s.
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]						
+.02***	+.02***	+.02***	+.01***	+.02***	n. s.	+.01*

We found that age was most systematically related to two policy issues. First, as age increased, perceptions of the importance of retaining nuclear weapons increased among the members of each participating group, except the Union of Concerned Scientists in 1993. Second, age was a significant predictor of support for investments in nuclear weapons infrastructure, and again, support increased with respondent age. This relationship held across all participating groups except the Union of Concerned Scientists in 1993.

Relationships between age and nuclear weapons investments for such activities as developing and testing new weapons, maintaining weapons in reliable condition, increasing the safety of nuclear weapons, and training those responsible for managing nuclear weapons were statistically significant for some groups, but not as consistently as for the previously mentioned issues.

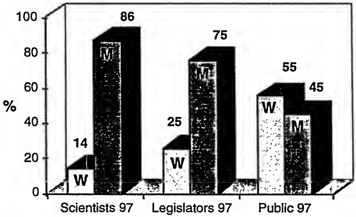
Section 5.2: Relating Gender to Views about Nuclear Security

To gain insight about potential implications of gender for perceptions about nuclear weapons and security policies, we compared the views of women and men respondents about our major nuclear risk/benefit indices and about a selection of policy issues. Because women were estimated to constitute only approximately seven percent of total membership in American Men and Women of Science, we included an oversample of women from that organization to insure that we had a sufficient number of respondents who were women scientists to make reliable gender comparisons. Throughout this report, respondents from the oversample of female scientists have been excluded from all analyses not based on gender. However, the oversample of female scientists has been included in the following analysis of gender differences.[1]

Figure 5.7 summarizes the distribution of participants from each of our three respondent groups by gender.

Figure 5.7

1997 Respondent Groups by Gender



By including the oversample of women among American Men and Women of Science, we doubled the proportion of female respondents from seven to 14 percent. Respondents in the legislator group were divided such that 25 percent were women and 75 percent were men. Respondents from the general public included 55 percent women and 45 percent men.

Gender and Perceptions of Nuclear Weapons Risks

Table 5.7 compares mean values by gender for the external nuclear weapons risk index, and Table 5.8 compares mean values for the domestic nuclear weapons risk index by gender.[2] In addition to our three respondent groups from 1997, comparisons include results from our surveys of the general public in 1995 and 1993, and from our surveys of the membership of the Union of Concerned Scientists (UCS) and the technical staffs of four US national laboratories in 1993.[3]

Table 5.7 Mean External Nuclear Risk Index by Gender

Mean External Nuc. Risk Index	Scien. 97[4]	Legis. 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
Women	6.2	6.1	6.5	6.4	6.6	6.3	6.9
Men	5.6	5.9	6.2	6.3	6.3	6.1	6.9
Difference	0.6	0.2	0.3	0.1	0.3	0.2	0.0
p-value	<.0001	n. s.	.0020	n. s.	.0003	n. s.	n. s.

Table 5.8 Mean Domestic Nuclear Risk Index by Gender

Mean Domestic Nuc. Risk Index	Scien. 97[5]	Legis. 97	Public 97	Public 95[6]	Public 93[7]	UCS 93[7]	Labs 93[7]
Women	4.7	4.7	5.7	6.4	6.7	6.8	3.7
Men	3.5	3.6	4.5	4.9	5.4	5.4	2.8
Difference	1.2	1.1	1.2	1.5	1.3	1.4	0.9
p-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

External Nuclear Risks

These results indicate a pronounced difference in the ways in which men and women respondents viewed external risks versus domestic risks associated with nuclear weapons. As shown in Table 5.7, gender differences in perceptions of risks associated with others' nuclear weapons (external nuclear risks) were statistically significant for two of our three 1997 respondent groups as well as participants from the general public in 1993. Absolute differences were relatively small and did not reach statistical significance for the other groups and surveys.

Domestic Nuclear Risks

However, gender differences were quite pronounced when the risks being evaluated were related to our own nuclear weapons resources. Table 5.8 shows a marked difference in the ways women and men perceived risks of manufacturing, transporting, storing, disassembling, and storing materials from disassembled weapons in the US, and in the likelihood of an unauthorized use or the accidental detonation of a US nuclear weapon, all of which were combined in the domestic nuclear weapons risk index. Here, regardless of technical background, professional affiliation, or general public membership, women in each respondent group perceived management of the US nuclear arsenal to pose significantly greater risks than men perceived. These differences are highly statistically significant, and they may be of important operational significance for strategic policy evolution. Issues such as nuclear materials management and disposition can be expected to involve similar differences in risk perceptions based on gender, and policy development processes may benefit from an appreciation of the implications of gender for domestic risk perceptions.[8]

Gender and Perceptions of Nuclear Weapons Benefits

To determine if gender differences were as distinct in the perceptions of benefits derived from nuclear weapons, we examined our external and domestic nuclear weapons benefit indices. Comparative results are summarized in Tables 5.9 and 5.10.

Table 5.9 Mean External Nuclear Benefit Index by Gender

Mean Ext. Nuc. Benefit Index	Scien. 97[9]	Legis. 97	Public 97	Public 95	Public 93[10]	UCS 93[10]	Labs 93[10]
Women	5.8	6.3	6.9	7.0	6.4	4.2	6.6
Men	6.5	7.4	6.9	7.1	6.6	4.7	7.1
Difference	0.7	1.1	0.0	0.1	0.2	0.5	0.5
p-value	<.0001	<.0001	n. s.	n. s.	n. s.	.0135	.0011

Table 5.10 Mean Domestic Nuclear Benefit Index by Gender

Mean Dom. Nuc. Benefit Index	Scien. 97[11]	Legis. 97	Public 97	Public 95	Public 93[12]	UCS 93	Labs 93
Women	5.4	6.1	6.6	6.6	5.1	3.5	5.5
Men	5.7	6.6	6.6	6.6	4.9	3.4	5.6
Difference	0.3	0.5	0.0	0.0	0.2	0.1	0.1
p-value	n. s.	.0037	n. s.	n. s.	n. s.	n. s.	n. s.

Gender based differences in views of benefits deriving from US nuclear weapons were much less pronounced than the differences observed in men's and women's perceptions of nuclear risks, but an interesting pattern emerged. Table 5.9 shows that statistically significant differences among women and men in perceptions of the external benefits associated with US nuclear weapons were not found among any of our general public samples, but significant gender based differences were evident in each of our four elite groups measured since 1993. Men and women from the general public viewed external benefits similarly, but men and women having either technical training or legislative experience saw potential nuclear weapons benefits differently, and in each case men respondents perceived greater benefits than did their women counterparts.

When our focus shifted to perceptions of domestic benefits, differences in men's and women's assessments were statistically significant only for the legislative group in 1997, where men legislators perceived significantly more domestic benefits to derive from US nuclear weapons capabilities than did women legislators.

Gender and Policy and Spending Preferences

Table 5.11 summarizes responses by gender to five policy and spending questions. All were answered on a one (lowest value) to seven (highest value) scale except for question 1-31, which used a scale where zero meant *not at all important,* and ten meant *extremely important.*

Table 5.11 Mean Policy and Spending Preferences by Gender

Means	Scien. 97[13]	Legis. 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
1-29. Feasible to eliminate all nuclear weapons within next 25 years							
Women	3.6	3.4	4.0	4.1	4.0	4.3	2.5
Men	3.2	2.9	3.5	3.8	3.6	3.8	2.1
Difference	0.4	0.5	0.5	0.3	0.4	0.5	0.4
p-value	.0054	.0022	.0003	.0179	.0068	.0004	.0003
1-31. Importance of retaining US nuclear weapons							
Women	6.4	6.8	7.1	6.6	6.4	3.9	7.3
Men	7.5	8.1	7.3	7.0	6.7	4.7	8.0
Difference	1.1	1.3	0.2	0.4	0.3	0.8	0.7
p-value	<.0001	<.0001	n. s.	.0061	n. s.	.0003	<.0001
1-37. Funding to increase safety of nuclear weapons							
Women	5.0	5.0	5.7	5.3	5.4	4.2	4.8
Men	4.9	5.3	5.5	5.2	5.1	3.8	4.8
Difference	0.1	0.3	0.2	0.1	0.3	0.4	0.0
p-value	n. s.	.0274	.0249	n. s.	.0036	.0028	n. s.
1-39. Funding to sustain nuclear research infrastructure							
Women	3.8	3.9	4.6	4.0	3.6	2.2	4.2
Men	4.1	4.8	4.3	3.9	3.7	2.3	4.4
Difference	0.3	0.9	0.3	0.1	0.1	0.1	0.2
p-value	.0035	<.0001	.0025	n. s.	n. s.	n. s.	n. s.
1-27. Participating in a fissile material cutoff							
Women	5.6	5.0	5.3	5.3	N/A	N/A	N/A
Men	5.2	4.4	5.0	5.3	N/A	N/A	N/A
Difference	0.4	0.6	0.3	0.0	N/a	N/A	N/A
p-value	.0027	.0016	.0166	n. s.	N/A	N/A	N/A

For these issues, the largest and most consistent gender differences across all respondent groups were found in reactions to a statement asserting that it is feasible to eliminate all nuclear weapons worldwide within the next 25 years. Women were significantly more likely to agree with that statement than were men. These differences existed among each of our seven groups since 1993. The direction was consistent, and the size of the differences in means were remarkably alike, indicating that gender influences were quite similar across elite and general publics and have been persistent since 1993.

Eliminating Nuclear Weapons

Also, when asked about the importance of retaining nuclear weapons today, women in each of the seven groups rated the importance of retention below the level of importance assigned by men, and the differences were statistically significant for five of the seven groups.

Retaining Nuclear Weapons

Gender differences about the other three issues were less distinct. For example, no clear pattern of gender based differences was evident in responses to a question about how government spending should change for increasing the safety of nuclear weapons. Here, means for men and women differed significantly among respondents from the Union of Concerned Scientists, but not among scientists from the national laboratories or among members of American Men and Women of Science. Gender differences were significant among participating state legislators and among respondents from the general public in 1997 and 1995, but not in 1993.

When asked how government spending should change for maintaining the ability to develop and improve US nuclear weapons in the future, responses from men and women did not significantly differ in either of our two previous studies, but gender differences were significant for each of our three 1997 respondent groups.

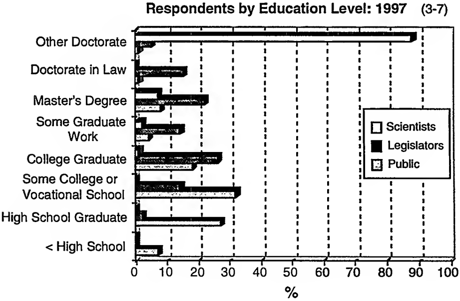
The final question in Table 5.10 was included in 1995 and 1997, but not in 1993. It asked respondents how they felt about the US participating in a fissile material cutoff treaty. Gender differences were significant for all three 1997 groups, but not for the general public in 1995.

These and other findings indicate that the effects of gender on perceptions about nuclear risks and benefits and security policy preferences are mixed. For issues that were most directly related to potential risks from our own nuclear weapons, these data showed a clear and consistent tendency for women to perceive higher risks than men. Our evidence also indicated that women may be more willing to consider the complete elimination of nuclear weapons than are men. However for issues relating to investments in nuclear weapons safety and infrastructure, as well as a potential treaty limiting the production of fissile materials, differences between the views of men and women were smaller, and often were statistically equivalent.

Section 5.3: Relating Education to Views about Nuclear Security

FIGURE 5.8 SUMMARIZES THE DISTRIBUTION OF EDUCATION LEVELS reported by each of our 1997 respondent groups. Doctorate level degrees have been grouped except for J.D. degrees in law, which are listed separately.

Figure 5.8



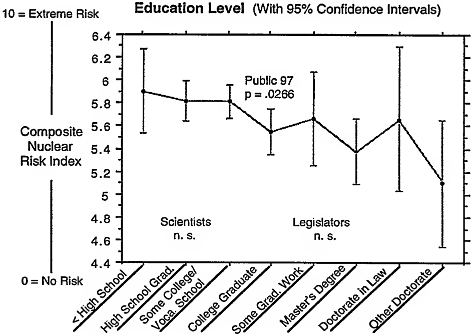
We analyzed the relationships of education to nuclear risk and benefit perceptions and policy preferences in three ways. First, we compared mean perceptions of composite nuclear weapons risks and benefits by level of education. Then we used education as a continuous independent variable in bivariate regressions to predict perceived risks and benefits of nuclear weapons. Finally, we examined the relationships between education and nuclear security policy and spending preferences using regression analysis.

Education vs. Perceptions of Nuclear Weapons Risks

Figure 5.9 displays results of an analysis of variance to test the statistical significance of differences in mean perceptions of nuclear weapons risks (as measured by the composite nuclear risk index) differentiated by level of formal education. Of our three 1997 respondent groups, education levels were statistically relevant to perceptions of nuclear weapons risks only among respondents from the general public.

Figure 5.9

Mean Composite Nuclear Risk Perceptions by Education Level (With 95% Confidence Intervals)



These findings are not unexpected. Given the educational attainments common to a career in science or service as elected legislators, we would expect education to be much less differentiated among our two elite groups than among members of the general public. Also expected are the results shown in Table 5.12 when we used education as an independent variable to predict risk perceptions in bivariate regressions. Again statistically significant relationships between education and risk were found only among respondents from the general public.

Table 5.12 Relating Education to Composite Nuclear Weapons Risk Perceptions (Bivariate Regressions)

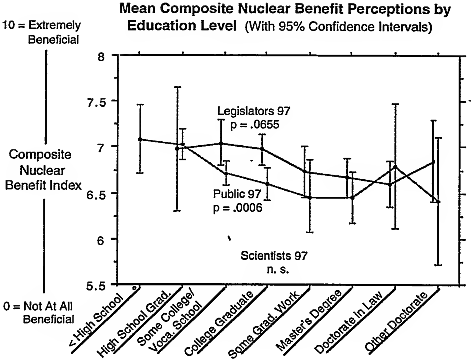
Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Legislators 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Public 1997	6.05	–.10	–3.53	.0004	.01

As education increased one level among respondents from the general public, composite perceptions of risks associated with nuclear weapons declined one tenth of a point on a zero to ten scale. This relationship was highly statistically significant.

Education vs. Nuclear Weapons Benefits

Given the above findings, should we expect to find education to be systematically linked to perceptions of nuclear weapons benefits? Actually, findings were similar for two of our three groups, but slightly different for the third. Figure 5.10 summarizes results of analyses of variance examining mean nuclear benefit perceptions by education level for all three 1997 groups.

Figure 5.10



Education level was highly significantly related to perceptions of nuclear weapons benefits among respondents from the general public in 1997. Though education level was not related to perceived benefits at the standard .05 level among responding state legislators, the observed relation between education and perceived benefits would have occurred only about six times out of a hundred, and thus just missed the 95 percent confidence level. Among participating scientists, education was not systematically related to perceived nuclear benefits.

When we used education as an independent variable in bivariate regressions to predict external and domestic nuclear weapons benefits as expressed by the composite nuclear benefit index, we found statistically significant relationships among both the general public and the legislator groups. Again, education was not significantly related to benefit perceptions among respondents from American Men and Women of Science. Regression results are summarized in Table 5.13.

Table 5.13 Relating Education to Composite Nuclear Weapons Benefit Perceptions (Bivariate Regressions)

Composite Nuc. Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Legislators 1997	7.36	–.12	–2.72	.0068	.01
Public 1997	7.16	–.12	–4.35	<.0001	.01

Regression results were very similar among participants from the general public and from participating state legislators. As education increased one level among either group, perceptions of nuclear weapons benefits decreased 0.12 on a scale from zero to ten. As shown by the small adjusted R^2, the power of educational attainment for explaining views about nuclear weapons benefits was minimal.

Education Level and Policy and Spending Preferences

To measure the degree to which education was related to selected policy and spending issues, we employed education level as an independent variable in bivariate regressions to predict preferences in several policy and spending options. As shown in Table 5.14, education was not a strong predictor of policy and spending preferences among any of our three 1997 respondent groups. In previous surveys, education has been inversely related to preferences for nuclear weapons investments; as education levels increased, support for nuclear weapons investments tended to decrease.

Table 5.14 Relating Education to Nuclear Weapons Policy Preferences
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Scientists 97	Legislators 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
1-31. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]						
n. s.	n. s.	n. s.	–.12*	–.29***	n. s.	–.18**
1-35. Funding for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	–.10**	–.10**	–.07*	–.14***	–.05*	–.28***
1-36. Funding to maintain reliable nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	n. s.	n. s.	+.08*	–.13**	–.11**	–.17***
1-37. Funding to increase safety of nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	n. s.	n. s.	n. s.	–.14***	–.10*	–.13***
1-38. Funding to train those managing nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	n. s.	n. s.	+.08**	n. s.	–.08*	–.12***
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]						
n. s.	–.09*	–.11**	–.07*	–.14***	n. s.	–.20***

Section 5.4: Relating Income to Views about Nuclear Security

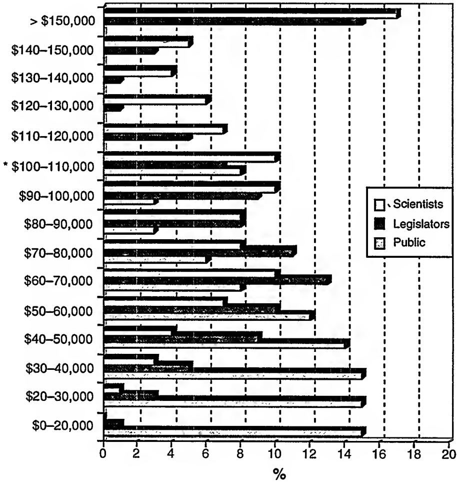
As expected when elite and general publics are compared, household income differences among respondent groups were substantial, with median income ranges as follows:

- Scientist group: $90,000 to $100,000
- Legislator group: $70,000 to $80,000
- General public group: $40,000 to $50,000

Figure 5.11 summarizes the distribution of household income levels reported by each of our 1997 groups. Incomes for respondents from the general public that exceeded $100,000 were grouped together. Those incomes that exceeded $150,000 for scientists and legislators were also combined for each respective group.

Figure 5.11

Household Income Levels: 1997



* Includes all income levels above $100,000 for the general public.

Analysis of variance among income categories for each of the three respondent groups indicated that household income was not systematically related to mean composite perceptions of nuclear weapons risks or benefits among any of our three respondent groups. When we used income as a continuous independent variable in bivariate regressions in which the composite nuclear weapons risk index or the composite nuclear weapons benefit index was the dependent variable, we found income to be a statistically significant predictor of composite nuclear risks among the scientist and general public groups, but not among the legislator group. Table 5.15 summarizes these results.

Table 5.15 Relating Income to Composite Nuclear Weapons Risk Perceptions (Bivariate Regressions)

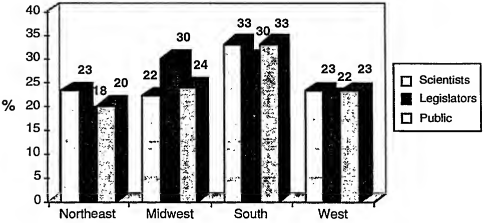
Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.86	–.02	–2.17	.0301	<.01
Legislators 1997	n. s.	n. s.	n. s.	n. s.	n. s.
Public 1997	5.90	–.04	–2.22	.0264	<.01

Income was not significantly related to perceived nuclear weapons benefits among any of the three groups, and income was not a useful predictor of nuclear weapons policy and spending preferences.

Section 5.5: Relating Geographic Region to Views About Nuclear Security

To determine if place of residence was related to respondent views about nuclear weapons risks and benefits and associated policy and spending issues, we categorized each respondent's primary residence by the four US Census regions described in Chapter One: Northeast, Midwest, South, and West. Figure 5.12 summarizes distributions by region for each of our three respondent groups.

Figure 5.12 Respondents by Geographic Region: 1997



Region and Perceptions of Nuclear Weapons Risks and Benefits

Table 5.16 compares mean values for the composite nuclear weapons risk index, and Table 5.17 compares mean values for the composite nuclear weapons benefit index by region. Note that respondents from the technical staffs of four national laboratories in 1993 were not appropriate for regional analysis, since all were located in the western region.

Table 5.16 Mean Composite Nuclear Weapons Risk Index by Region

Mean Composite Nuc. Risk Index	Scien. 97	Legis. 97	Public 97	Public 95[14]	Public 93	UCS 93	Labs 93
Midwest	4.60	4.85	5.76	5.89	6.21	6.00	N/A
Northeast	4.72	5.20	5.45	6.15	6.16	6.10	N/A
South	4.59	4.86	5.81	6.08	6.17	5.92	N/A
West	4.62	4.85	5.70	6.00	6.16	6.00	N/A
ANOVA p-value	n. s.	n. s.	.0464	n. s.	.0003	n. s.	N/A

Table 5.17 Mean Composite Nuclear Weapons Benefit Index by Region

Mean Composite Nuc. Ben. Index	Scien. 97	Legis. 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
Midwest	6.00	6.60	6.72	6.73	5.93	3.92	N/A
Northeast	5.85	6.41	6.53	6.69	5.72	3.92	N/A
South	6.30	7.13	6.90	6.96	6.00	4.17	N/A
West	6.08	6.78	6.63	6.75	5.28	3.95	N/A
ANOVA p-value	.0139	.0013	.0155	.0197	<.0001	n. s.	N/A

Perceptions of external and domestic nuclear weapons risks were not well differentiated by region, with statistically significant differences in means emerging only for respondents from the general public in 1997 and 1993, but not for the general public in 1995, nor for any of the elite groups. To insure that perceptions of external and domestic nuclear risks were not partially offset when combined into the composite nuclear weapons risk index, we also examined component risk perceptions separately, but we did not find significant differences based on region.

Conversely, perceptions of composite nuclear weapons benefits were well differentiated, with statistically significant differences in means among regions within all participating groups except the Union of Concerned Scientists in 1993.

We found no systematic pattern in which geographic region was significantly related to differences in mean preferences for nuclear policy and spending options among any of our three 1997 respondent groups.

Section 5.6: Summarizing Demographic Implications

RESPONDENT AGE WAS STATISTICALLY SIGNIFICANTLY RELATED TO perceptions of nuclear weapons risks and benefits among most groups, but age did not exhibit strong explanatory power. In general, as age increased, perceptions of nuclear weapons risks tended to decrease, and perceptions of nuclear weapons benefits tended to increase. Though it is still too soon after the end of the Cold War to answer the question of how not experiencing the Cold War may influence the valuation of nuclear deterrence, we found that assessed importance of nuclear deterrence tended to increase with age, and thus our data are consistent with a hypothetical generational change in the ways in which nuclear deterrence is evaluated. We believe that these findings warrant continuing research. Certainly the implications of evolutionary changes in the ways in which nuclear deterrence is understood in the post-Cold War era will be important to public debate about the future of nuclear security.

Age

We found that age was inconsistently related to a range of nuclear security policy and spending issues. Age was most importantly related to questions about retaining nuclear weapons and about investments in US nuclear weapons infrastructure. Age was positively and significantly related to perceived importance of retaining nuclear weapons and preferences for increasing investments in nuclear infrastructure.

Gender

Gender implications are particularly important as they relate to perceptions of risks associated with our own nuclear weapons. We found large differences among each of our seven respondent groups from 1993 to 1997 in the ways in which men and women perceived domestic nuclear weapons risks. While some gender differences were also evident in perceptions of external nuclear risks, they were much smaller and less systematic. Gender differences in external nuclear benefits were found only among the elite groups, and differences in the ways men and women valued the domestic benefits of nuclear weapons were not significant except for the legislator group. Gender was also related to certain policy and spending preferences, most notably regarding the perceived feasibility of eliminating all nuclear weapons. Women were significantly more likely to consider the worldwide elimination of nuclear weapons to be feasible than were men. Women also rated the importance of the US retaining nuclear weapons lower than did men.

Education

Education was systematically related to perceptions of nuclear weapons risks and benefits among respondents from the general public. As formal education increased, perceptions of both nuclear weapons risks and benefits tended to decrease. Education was not a strong predictor of risk perceptions among either of our elite groups in 1997, and was only weakly related to benefit perceptions among the legislator group, tending to decline with age. Education was not a strong predictor of nuclear security policy and spending preferences for any of the three groups.

Income

Income was related to perceptions of nuclear weapons risks among the scientist and general public groups, but not among the legislator group. Income was not systematically related to perceptions of nuclear benefits or to nuclear weapons policy or spending choices.

Region

Mean perceptions of nuclear weapons *risks* did not vary significantly by region among any of the elite groups, but mean differences in nuclear risk perceptions among geographic regions were significantly different for respondents from the general public in 1997 and 1993, but not in 1995. However, mean perceptions of the *benefits* associated with US nuclear weapons were significantly different among geographic regions for the scientist and legislator groups in 1997 and for respondents from the general public in 1993, 1995, and 1997. For each respondent group, perceptions of nuclear weapons benefits were highest among participants from the south.

Having examined several dimensions of demographic characteristics to better understand their relationships to perceptions of nuclear weapons risks, benefits, and policy preferences, in Chapter Six we turn our attention to the role of belief systems in views about nuclear security.

End Notes

[1] A comparison of women scientist respondents from the base sample of American Men and Women of Science to women scientist respondents from the oversample indicated no significant differences in mean age, education, income, political ideology, party identification, external nuclear risk index, domestic nuclear risk index, external nuclear benefit index, or domestic nuclear benefit index.

[2] The external and domestic nuclear weapons risk indices used here were developed and illustrated in Chapter Two.

[3] For details about sampling and reporting procedures used for the 1995 survey of the US general public, see: Kerry G. Herron and Hank C. Jenkins-Smith, 1996, *Evolving Perceptions of Security: US National Security Surveys 1993–1995,* document ID: SAND96-1173, Albuquerque, NM: Sandia National Laboratories. For details about sampling and reporting procedures used for the 1993 survey of the US general public, the Scientists' Action Committee of the Union of Concerned Scientists, and respondents from the technical staffs of Los Alamos National Laboratory, Sandia National Laboratories, Pacific Northwest National Laboratory, and Lawrence Berkeley National Laboratory see: Hank C. Jenkins-Smith, Richard P. Barke, and Kerry G. Herron, 1994, *Public Perspectives of Nuclear Weapons in the Post-Cold War Environment: Findings and Analysis of the National Security Survey: Perceptions and Policy Concerns 1993–1994,* document ID: SAND94-1265, Albuquerque, NM: Sandia National Laboratories.

[4] To insure a sufficiently large sample, gender comparisons among the American Men and Women of Science included an oversample of women.

[5] See note 4.

[6] Mean domestic nuclear weapons risk index values from our survey of the general public in 1995 have been recalibrated to adjust for risk context and order effect in accordance with the discussion in Chapter Two, Section 2.3.

[7] In our 1993 report, this index was termed the Nuclear Weapons Management Risk Index. It included the same seven questions subsequently used in the 1995 and 1997 surveys to form this index, plus a question about perceived risks of testing nuclear weapons. For purposes of comparisons, the question about nuclear testing was removed from the calculation of the domestic nuclear weapons risk index for each of the three 1993 respondent groups.

[8] For empirical evidence of gender differences in perceptions of risks associated with nuclear issues, see the following sources. (1) Richard P. Barke, Hank Jenkins-Smith, and Paul Slovic, 1997, "Risk Perceptions of Men and Women Scientists," *Social Science Quarterly,* 78(1):167–176. (2) Marilyn K. Dantico

and Ann Gordon, 1996, "Gender Differences and Perceptions of Risk: The Yucca Mountain Nuclear Waste Repository," paper delivered at the annual meeting of the Western Political Science Association, San Francisco, CA, March 13–16. (3) Hank Jenkins-Smith, et al., 1994, "A Cognitive Filtering Model of the Perceived Risk of Environmental Hazards," in *Waste Management: From Risk to Remediation, Volume 1,* eds. R. K. Bhada, et al., Albuquerque, NM, ECM Press. (4) Hank C. Jenkins-Smith, Carol L. Silva, and Amy Fromer, 1995, "Public Perceptions of the Cesium-137 Transportation Program," Albuquerque, NM: UNM Institute for Public Policy. (5) Hank C. Jenkins-Smith, Carol L. Silva, Amy Fromer, and John Conwell, 1995, "Public Perceptions of the Foreign Spent Nuclear Fuel Return Program," Albuquerque, NM: UNM Institute for Public Policy. (6) Paul C. Stern and Thomas Dietz, 1994, "The Value Basis of Environmental Concern," *Journal of Social Issues,* 50(3):65–84. (7) Robert E. O'Connor and Richard J. Bord, 1994, "Are Women Really More Environmentally Concerned? Gender Differences and the Politics of Environmentalism," paper presented at the annual meeting of the Midwest Political Science Association, Chicago, April.

[9] See note 4.

[10] In our 1993 report, this index was termed the Nuclear Utility Index. It included four of the seven questions subsequently used in the 1995 and 1997 surveys to form this index. However, it did not include the three questions about the valuation of nuclear deterrence that were added in 1995.

[11] See note 4.

[12] The composite nuclear weapons risk index represents a combination of the external nuclear weapons risk index and the domestic nuclear weapons risk index. The mean domestic nuclear weapons risk index values from our survey of the general public in 1995 have been recalibrated to adjust for risk context and order effect in accordance with the discussion in Chapter Two, Section 2.3.

[13] See note 4.

[14] See note 12.

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Chapter Six

Belief Systems and Nuclear Security

BELIEF SYSTEMS AND THEIR EMBEDDED IDEOLOGIES ARE COMPLEX, multidimensional sets of interactive variables that exert powerful influences on individuals and groups.[1] Among the kinds of organizing schema that ideologies provide are the following:

- Political concepts about how to organize society and where power appropriately resides and how it should be managed

- Social concepts about human interactions, social structure, and related issues of fairness, equity, and justice

- Economic concepts about how society's and the world's resources should be distributed and managed

- Moral concepts about what is right, wrong, and ethically acceptable behavior

- Concepts about the international community and how states should interact politically, socially, and economically

- Cosmological concepts about nature and how humans should relate to the natural world

As collections of schema for relating ideas and setting normative standards, ideologies provide guidance about how to choose and what to do that help form the basis for individual and group decisions, and they help shape the language in which debate is conducted. As lenses ground to the prescriptions of individual beliefs, they provide prisms through which we view reality, helping us merge ideas and convictions with empirical observations and facts. As filters, they cause us to subjectively sift information and observations, assigning greater validity to those things that conform more closely to our beliefs, and relegating those that do not to skepticism or discredit.

Dimensions of Beliefs

Debate about the future of nuclear weapons will be importantly influenced by ideologies and other underlying dimensions of belief systems that both limit and shape the context within which nuclear security issues are evaluated. To better appreciate the implications of multidimensional beliefs for the debate about the future of nuclear weapons, we asked several sets of questions that were designed to assess the influence of different facets or dimensions of individual beliefs. Though these relationships are not fully described by our data, and their implications are far more complex than can be investigated here, the dimensions of beliefs for which we have some tentative indicators include political, economic, social, moral, international, and eco-nature concepts. In this chapter, we describe our limited indicators for each of these dimensions of beliefs. Then we relate them to perceptions of nuclear weapons risks and benefits, and to selected policy options that may figure importantly in future deliberations about nuclear security.

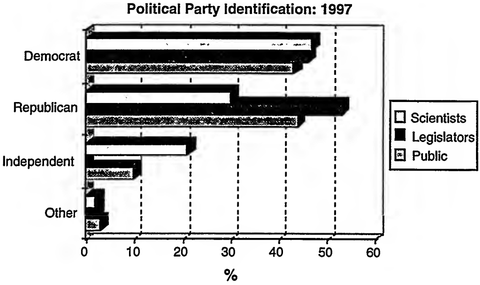
Section 6.1: Political Beliefs

We examined political orientation two ways. We asked participants to name the political party with which they most identified, and we asked them to characterize their overall political ideology on a scale from strongly liberal to strongly conservative.

Political Party

Beginning with political affiliation, Figure 6.1 reports the political parties with which respondents from each group most identified.

Figure 6.1

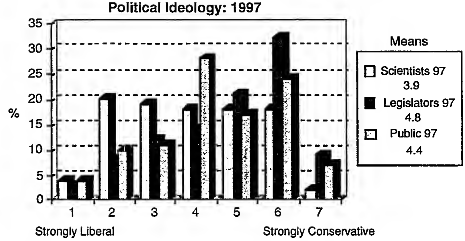


A plurality of 47 percent of the scientist group identified primarily with the Democrat party, with only 30 percent identifying with the Republican party and 21 percent stating that they were political independents. The legislator group was divided into 53 percent Republican and 46 percent Democrat. Respondents from the general public were almost evenly divided, with 44 percent stating that they most identified with the Republicans and 43 percent indicting that they identified with the Democrats. Ten percent of the general public were independents.

Political Ideology

Figure 6.2 describes the distributions and mean values of responses to our request for participants from each of the three response groups to classify their personal political ideology.

Figure 6.2



Notice that the distribution pattern is quite different for the scientist group compared to the legislator and general public groups, with scientists reporting an almost level distribution between the values of two and six, and a mean of 3.9. The distribution of the legislator group reflects some of the response bias identified in Chapter One relating to higher numbers of Republicans responding to the survey than Democrats and associated implications for more increased political conservatism. Note that the modal response for participating legislators was six, and their self-rated mean was 4.8. The modal response for the general public group was four, and their mean was 4.4. Differences in means among all three groups were highly statistically significant ($p < .0001$ for each pairing).

Next we used political ideology as the independent variable in bivariate regressions to examine the relationships of our major nuclear weapons risk and benefit indices to political ideology. Table 6.1 summarizes regression results for the external nuclear risk index, and Table 6.2 reports results for the domestic nuclear risk index.

Table 6.1 Relating Political Ideology to the External Nuclear Risk Index
(Bivariate Regressions)

External Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	5.27	+.10	3.34	.0009	.01
Legislators 1997	5.31	+.14	3.26	.0012	.02
Public 1997	n. s.	n. s.	n. s.	n. s.	n. s.

Table 6.2 Relating Political Ideology to the Domestic Nuclear Risk Index
(Bivariate Regressions)

Domestic Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.51	–.23	–6.52	<.0001	.04
Legislators 1997	6.57	–.56	–11.61	<.0001	.19
Public 1997	5.65	–.13	–3.46	.0006	.01

Political ideology was systematically related to perceptions of external and domestic nuclear weapons risks among both elite groups, but ideology was related only to perceptions of domestic nuclear risks among respondents from the general public. Note the substantial explanatory power of political ideology for domestic nuclear risk perceptions among the state legislator group, where an increase of one point on the ideology scale (more conservative) resulted in a decrease of .56 points in perceptions of risks associated with our own nuclear weapons and explained 19 percent of the variation in domestic risk perceptions.

Table 6.3 reports the results of a bivariate regression in which political ideology was used to predict perceptions of external nuclear weapons benefits, and Table 6.4 shows regression results for ideology vs. domestic nuclear benefits.

Table 6.3 Relating Political Ideology to the External Nuclear Benefit Index
(Bivariate Regressions)

External Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.29	+.56	16.29	<.0001	.19
Legislators 1997	4.05	+.64	15.24	<.0001	.29
Public 1997	5.47	+.32	9.39	<.0001	.07

Table 6.4 Relating Political Ideology to the Domestic Nuclear Benefit Index
(Bivariate Regressions)

Domestic Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	3.97	+.45	12.75	<.0001	.13
Legislators 1997	4.56	+.40	9.18	<.0001	.13
Public 1997	6.11	+.10	2.85	.0045	.01

Political ideology was systematically related to perceptions of external and domestic nuclear weapons benefits among all three groups. The explanatory power of political ideology was particularly noteworthy for both elite groups, reaching an R^2 of 29 percent among respondents who were legislators and an R^2 of 19 percent for scientist respondents.

Next we used political ideology as the independent variable in separate bivariate regressions to explain variation in a variety of nuclear security policy and spending options among all respondent groups since 1993.

Table 6.5 Relating Political Ideology to Policy and Spending Preferences
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Scientists 97	Legislators 97	Public 97	Public 95	Public 93	UCS 93	Labs 93
1-29. Feasible to eliminate all nuclear weapons in next 25 years [1= Strongly Disagree — 7 = Strongly Agree]						
−.42***	−.53***	−.25***	−.30***	−.08*	−.36***	−.28***
1-31. Importance of retaining US nuclear weapons today [0 = Not At All Important — 10 = Extremely Important]						
+.61***	+.76***	+.45***	+.52***	+.45***	+.82***	+.64***
1-35. Funding for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Stubstantially Increase]						
+.32***	+.42***	+.18***	+.19***	+.20***	+.21***	+.39***
1-36. Funding to maintain reliable nuclear weapons? [1 = Substantially Decrease — 7 = Substantially Increase]						
+.26***	+.31***	+.18***	+.17***	+.13***	+.31***	+.26***
1-39. Funding to sustain nuclear research infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]						
+.37***	+.47***	+.27***	+.22***	+.24***	+.36***	+.39***
1-26. US participation in a comprehensive test ban[2] [1 = Strongly Oppose — 7 = Strongly Support]						
−.41***	−.60***	−.17***	−.16***	N/A	N/A	N/A
1-27. US participation in a fissile material cutoff agreement[3] [1 = Strongly Oppose — 7 = Strongly Support]						
−.43***	−.64***	−.20***	−.18***	N/A	N/A	N/A

The ways in which political ideology was related to nuclear weapons policy preferences and spending priorities is highly consistent. Whether the respondents were scientists, legislators, or members of the general public, and whether the measurements were taken in 1993, 1995, or 1997, political ideology was significantly related to policy and spending preferences among all groups. In all but one instance, the observed relationship would have occurred by chance fewer than once in 10,000 times.

Section 6.2: Social Concepts

AMONG THE MOST CENTRAL ORGANIZING PRINCIPLES FOR SOCIETIES ARE concepts of power and equity. To gain some insight about how beliefs about these concepts may be related to views about nuclear security, we asked participants to respond to the following three statements using a scale where one meant strongly disagree, and seven meant strongly agree:

- Our society needs to make the distribution of goods more equal. (3-19)
- Society works best if power is shared equally among all citizens. (3-20)
- It is not enough to provide roughly equal *opportunities*; government must insure that *outcomes* are roughly equal. (3-21)

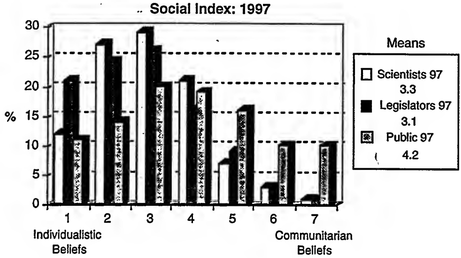
Factor analysis of the three component questions indicated that they were related to a single underlying factor that explained well over half of the variation among responses. We termed that factor the "social index." Correlations were highly significant for each group (p <.0001), and factor loadings were all in the same direction and of similar magnitude. Results of the factor analysis are summarized in Table 6.6.

Table 6.6 Factor Analysis of Components of the Social Index

Group	Number of Factors	Eigenvalue	Proportion of Variance	Unrotated Factor Loads	P Value
Scientists 97	1	1.73	.58	.82 (3-19) .66 (3-20) .84 (3-21)	<.0001
Legislators 97	1	1.84	.61	.86 (3-19) .64 (3-20) .83 (3-21)	<.0001
Public 97	1	2.03	.68	.84 (3-19) .77 (3-20) .85 (3-21)	<.0001

Responses were combined to form a social index calibrated such that a value of one (indicating strong disagreement with the above statements) represented more individualistic beliefs, and seven (indicating strong agreement with the three statements) represented more communitarian beliefs. The distributions and mean values for the social index are shown in Figure 6.3.

Figure 6.3



The differences in distribution patterns and means reflected significant differences ($p < .0001$ for each pairing) between views of the two elite groups, which shared more individualistic outlooks, and views of the general public group, whose members were somewhat more evenly distributed across the scale.

We then used the social index as the independent variable in separate bivariate regressions in which the composite nuclear weapons risk index and the composite nuclear weapons benefit index were dependent variables. Results of the regression using the social index to predict composite nuclear weapons risks are shown in Table 6.7. Results of the regression to predict nuclear weapon benefits are shown in Table 6.8.

Table 6.7 Relating the Social Index to the Composite Nuclear Weapons Risk Index (Bivariate Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.36	+.08	2.44	.0150	.01
Legislators 1997	4.01	+.29	6.82	<.0001	.08
Public 1997	5.08	+.15	5.59	<.0001	.02

Table 6.8 Relating the Social Index to the Composite Nuclear Weapons Benefit Index (Bivariate Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	7.48	–.42	–10.83	<.0001	.10
Legislators 1997	8.28	–.49	–10.76	<.0001	.17
Public 1997	n. s.	n. s.	n. s.	n. s.	n. s.

Our social index was systematically related to perceptions of nuclear weapons risks among all three respondent groups. Perceptions of composite nuclear weapons risks increased with greater communitarian values. However, explanatory power was modest. Composite nuclear benefits were highly related to the social index among both elite groups, but not among respondents from the general public. Among the scientist and legislator groups, perceptions of composite nuclear weapons benefits decreased with increasing communitarian values. Explanatory power was highest for the legislator group, where the social index accounted for 17 percent of variation in perceptions of composite nuclear weapons benefits.

Table 6.9 shows the results of using the social index as the independent variable in bivariate regressions to predict a selection of nuclear policy and investment preferences.

Table 6.9 Relating the Social Index to Nuclear Weapons Policy
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

SOCIAL INDEX VS. ISSUES	SCIENT. 97	LEG. 97	PUBLIC 97
1-29. Feasibility of eliminating all nuclear weapons [1 = Not At All Important — 7 = Extremely Important]	+.43***	+.66***	+.36***
1-31. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]	–.58***	–.80***	–.17***
1-23. Minumum acceptable number of US nuclear weapons [1 = 7,000–6,500 with deceasing increments of 500 to 15 = 0]	+.59***	+.88***	n. s.
1-35. Spending for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	–.25***	–.35***	n. s.
1-39. Spending for sustaining US nuclear weapons infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	–.30***	–.40***	n. s.
1-26. US participation in a treaty banning all nuclear test explosions [1 = Strongly Oppose — 7 = Strongly Support]	+.34***	+.60***	+.16***
1-27. US participation in a treaty banning production of fissile materials for nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	+.46***	+.67***	+.20***

To illustrate interpretation, as agreement with the combined three statements constituting the social index increased one point on a scale from one to seven, agreement with the statement: "It is feasible to eliminate all nuclear weapons worldwide within the next 25 years" increased by an average of 0.43 points within the scientist group, 0.66 points within the legislator group, and 0.36 points within the general public group. Note the consistency of agreement in direction of the effects among all three groups for each issue. These results show that our index of social beliefs was highly statistically significantly related to nuclear weapons policy and spending preferences among both elite groups, and was systematically related to four of the seven issues among respondents from the general public.

Section 6.3: Economic Concepts

TWO OF THE MOST BASIC CONCEPTS RELATING TO ECONOMIC IDEOLOGY have to do with beliefs about how income should be redistributed within society and how a state should interact economically with other states in the international system. To develop an indicator of such basic beliefs, we asked participants the following two questions.

- On a scale where zero means that government should collect and redistribute *no income,* and ten means that government should collect *all income* and redistribute it according to need, please indicate the degree to which you think government in the US should redistribute income. (3-13)

- Using a scale where one means *many fewer* trade restrictions, and seven means *many more* trade restrictions, how would you like to see current US policy change regarding trade imports to the US from other countries? (3-14)

Distributions and means are presented in Figures 6.4 and 6.5.

Figure 6.4

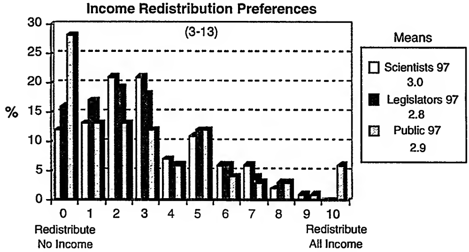
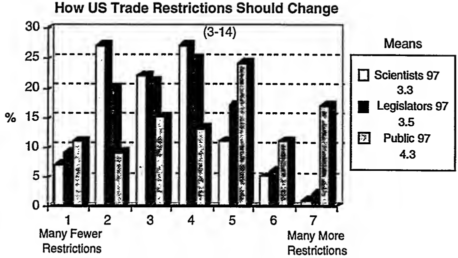


Figure 6.5



Because these questions address different dimensions of economic ideology, they do not lend themselves to being merged into a single index. Therefore we used both as independent variables in a multiple regression to predict composite nuclear risk and benefit perceptions. Results are summarized in Table 6.10 for the composite risk index, and Table 6.11 shows regression results for the composite benefit index.

Table 6.10 Relating Economic Beliefs to the Composite Nuclear Weapons Risk Index (Multiple Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.08	+.02 Redist.	n. s.	n. s.	.02
		+.16 Trade	4.99	<.0111	
Legislators 1997	3.91	+.10 Redist.	3.48	.0005	.08
		+.21 Trade	4.96	<.0001	
Public 1997	4.98	+.04 Redist.	2.71	.0068	.03
		+.14 Trade	5.61	<.0001	

Table 6.11 Relating Economic Beliefs to the Composite Nuclear Weapons Benefit Index (Multiple Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	6.52	–.03 Redist.	–2.17	:0304	.01
		+.08 Trade	3.17	.0016	
Legislators 1997	7.50	–.29 Redist.	–9.73	<.0001	.15
		+.02 Trade	n. s.	n. s.	
Public 1997	6.52	–.03 Redist.	–2.17	.0304	.01
		+.08 Trade	3.17	.0016	

With few exceptions, each of the two economic ideology questions were significantly related to perceptions of nuclear weapons risks and benefits. As preferences for income redistribution increased, and as preferences for more US trade restrictions increased, composite perceptions of nuclear weapons risks increased among all three respondent groups. However, as support for income redistribution increased, perceptions of composite nuclear weapons benefits decreased. As support for increasing trade restrictions increased, perceptions of nuclear weapons benefits increased. Again, results for each question were in the same direction across all three groups. The explanatory powers of both economic questions were modest, with the highest R^2 values in each case being associated with the legislator group. Table 6.12 shows similar relationships between the two economic indicator questions and nuclear policy and spending preferences.

Table 6.12 Relating Economic Beliefs to Nuclear Weapons Policies
(Multiple Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Economic Beliefs vs. Issues		Scient. 97	Leg. 97	Public 97
1-29. Feasibility of eliminating all nuclear weapons [1 = Strongly Disagree — 7 = Strongly Agree]	Redist. Trade	+.20*** −.11**	+.32*** n. s.	+.12*** n. s.
1-31. Importance of retaining US nuclear weapons today [0 = Not At All Important — 10 = Extremely Important]	Redist. Trade	−.34*** +.13*	−.49*** n. s.	−.08*** n. s.
1-23. Minumum acceptable number of US nuclear weapons [1 = 7,000–6,500, with decreasing increments of 500 to 15 = 0]	Redist. Trade	+.35*** −.32***	+.66*** n. s.	n. s. −.22**
1-35. Spending for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	Redist. Trade	−.14*** +.10***	−.25*** n. s.	n. s. +.11***
1-39. Spending for sustaining US nuclear weapons infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	Redist. Trade	−.17*** +.15***	−.28*** n. s.	−.06** +.15***
1-26. US participation in a treaty banning all nuclear test explosions [1 = Strongly Oppose — 7 = Strongly Support]	Redist. Trade	+.17*** n. s.	+.31*** n. s.	n. s. n. s.
1-27. US participation in a treaty banning production of fissile materials for nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	Redist. Trade	+.23*** n. s.	+.34*** n. s.	n. s. +.12***

Our economic indicators were most consistently related to policy preferences among the scientist group. Responses to the income redistribution question (3-13) were related to policy preferences among the legislator and general public groups, but the question about trade restrictions (3-14) was not related to policy or spending preferences among the legislator group, and was significantly related to only four issues among the general public group. In general, preferences for income redistribution were positively related to the following: (1) agreement that it is feasible to eliminate nuclear weapons; (2) lower minimum acceptable numbers of nuclear weapons; and (3) support for arms control. Income redistribution was negatively related to the importance of retaining US nuclear weapons and spending for developing and testing new nuclear weapons or sustaining nuclear weapons infrastructure. The trade question was less of a predictor of policy preferences, but among the scientist group, preferences for increased trade restrictions were positively related to the importance of US nuclear weapons and spending on nuclear weapons capabilities. Support for trade restrictions was negatively related to the feasibility of eliminating all nuclear weapons and to lower minimum numbers of US nuclear weapons.

Section 6.4: Beliefs about Internationalism

BECAUSE VIEWS OF INTERNATIONAL POLITICS FIGURE IMPORTANTLY IN nuclear security, we asked participants to respond to a series of statements designed to illuminate their beliefs about the international system and the degree to which they preferred the US to act independently or in concert with other states. The following statements were intended to represent increasing degrees of internationalism from a pure realist perspective to a more idealist view of the international system. Responses to each were provided on a scale where one meant *strongly disagree*, and seven meant *strongly agree.*

- In today's world, every country has to take care of itself. (3-22)
- The United States needs allies, because we cannot afford to go it alone. (3-23)
- Countries are becoming so interdependent that we will eventually need a world government. (3-24)

Distributions and mean responses to each statement are shown in Figures 6.6–6.8.

Figure 6.6

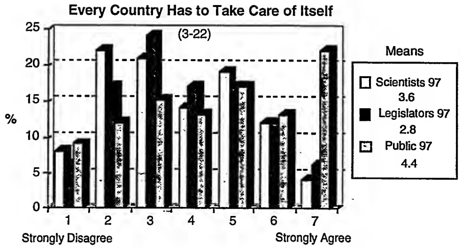


Figure 6.7

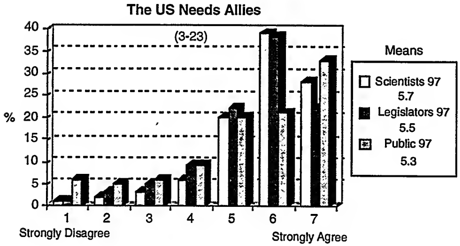
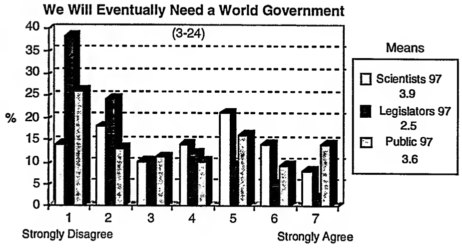


Figure 6.8



In Figure 6.6, the public reflected a stronger belief than either of the two elite groups that each country has to take care of itself (p <.0001). Intergroup differences in figure 6.7 were smaller, though still statistically significant, among responses to the statement that the US needs allies (p <.0001 for all parings). As shown in Figure 6.8, the legislators were most opposed to the statement that a world government will eventually be needed, and differences among all three groups again were highly statistically significant (p <.0001 for all pairings).

Factor analysis of responses to these three statements indicated that they were related to a single underlying factor that explained from 38 to 48 percent of the variation among the responses. We termed that factor "internationalism." Correlations were highly statistically significant for each group (p <.0001), and factor loadings were all in the same direction for each statement. With one exception for the first statement among the general public group, factor loadings were also of similar magnitude. Table 6.13 summarizes results.

Table 6.13 Factor Analysis of Components of the Index of Internationalism

Group	Number of Factors	Eigenvalue	Proportion of Variance	Unrotated Factor Loads	P Value
Scientists 97	1	1.38	.46	–.60 (3-22) +.68 (3-23) +.74 (3-24)	<.0001
Legislators 97	1	1.45	.48	–.75 (3-22) +.61 (3-23) +.72 (3-24)	<.0001
Public 97	1	1.14	.38	–.04 (3-22) +.76 (3-23) +.75 (3-24)	<.0001

After reversing the scale for question 3-22, the three were combined to form an index of internationalism where one represented the lowest level of internationalist beliefs, and seven represented the highest level of internationalist beliefs. The index was then used as the independent variable in two bivariate regressions in which composite nuclear risk and composite nuclear benefit perceptions were the dependent variables. Results of the regression to predict the composite nuclear weapons risk index are summarized in Table 6.14, and regression results for the composite nuclear weapons benefit index are shown in Table 6.15.

Table 6.14 Relating Beliefs About Internationalism to the Composite Nuclear Weapons Risk Index (Bivariate Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.15	+.10	2.65	.0081	.01
Legislators 1997	4.10	+.20	3.62	.0003	.02
Public 1997	n. s.	n. s.	n. s.	n. s.	n. s.

Table 6.15 Relating Beliefs About Internationalism to the Composite Nuclear Weapons Benefit Index (Bivariate Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	7.68	–.34	–7.33	<.0001	.05
Legislators 1997	8.74	–.49	–8.17	<.0001	.11
Public 1997	7.12	–.10	–2.58	.0101	.01

Beliefs about internationalism were systematically related to composite perceptions of nuclear weapons risks among the scientist and legislator groups, but not among the general public group. For the two elite groups, as beliefs in international integration increased, perceptions of composite nuclear weapons risks also increased.

Views about the international system were closely linked to composite perceptions of nuclear weapons benefits among all three respondent groups. As internationalism increased, perceptions of composite nuclear weapons benefits decreased among all groups. The explanatory power of beliefs about the international system were small in most instances, reaching a high of 11 percent for the legislators.

Next we used the index of internationalism as the independent variable in separate bivariate regressions with our previously selected nuclear weapons policy and spending options as independent variables. Results are summarized in Table 6.16.

Table 6.16 Relating Beliefs About Internationalism to Nuclear Weapons Policy
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Beliefs about Internationalism vs. Issues	Scient. 97	Leg. 97	Public 97
1-29. Feasibility of eliminating all nuclear weapons [1 = Strongly Disagree — 7 = Strongly Agree]	+.50***	+.56***	+.40***
2. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]	–.76***	–.83***	–.28***
1-23. Minumum acceptable number of US nuclear weapons [1 = 7,000–6,500, with decreasing increments of 500 to 15 = 0]	+.55***	+.92***	+.19**
1-35. Spending for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	–.26***	–.33***	–.11***
1-39. Spending for sustaining US nuclear weapons infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	–.35***	–.43***	–.14***
1-26. US participation in a treaty banning all nuclear test explosions [1 = Strongly Oppose — 7 = Strongly Support]	+.33***	+.51***	+.20***
1-27. US participation in a treaty banning production of fissile materials for nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	+.44***	+.54***	+.24***

These data reveal a strong and systematic relationship between views about the international system and nuclear weapons policy and investment preferences among both elite groups and the general public group.

The greater the propensity to take an international perspective, the more likely the respondent was to consider it feasible to eliminate all nuclear weapons, to favor arms control initiatives, and to reduce spending on nuclear weapons.

Section 6.5: Moral Beliefs

MORAL CONSIDERATIONS ARE AMONG THE MOST BASIC VALUES OF civilization, and they comprise deep and vital elements of belief systems for many people. Because of their profound implications, nuclear weapons capabilities have evoked strong moral considerations for many people since their inception. For some, no moral justification is possible for their use; for others, moral compunction is a function of the purposes for which nuclear capabilities are employed. The ways in which members of various publics evaluate the moral dimensions of nuclear weapons are likely to be integral to debate about the future of nuclear weapons, especially movements for their complete elimination. To gain some degree of appreciation for the moral dimension of belief systems as they relate to views about nuclear security, we asked participants to respond to the two following statements. Again, we used a scale where one meant *strongly disagree,* and seven meant *strongly agree.*

- The world would have been more peaceful if nuclear weapons had never been invented. (3-25)

- There are absolutely no circumstances in which I could justify launching a nuclear weapon against an enemy of the US. (3-26)

Distributions and mean responses are pictured in Figures 6.9 and 6.10.

Figure 6.9 **World Would Have Been Safer Without Nuclear Weapons**

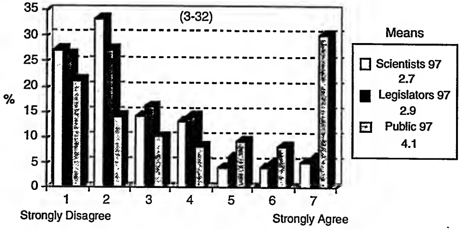
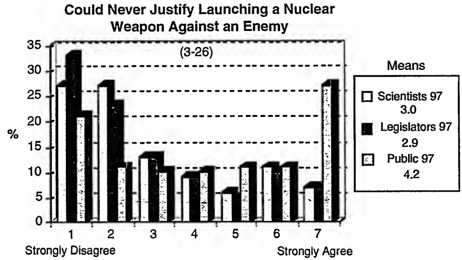


Figure 6.10



Notice that the distribution patterns were quite similar for responses to both questions, but that they differed significantly in their shape between the elite and general public groups. Also there were highly significant differences between the elite groups and the general public group in mean responses to each statement ($p < .0001$). The bimodal distribution of responses among the general public to both statements were particularly noteworthy. Though the mean values for the general public group were near midscale, the distribution indicated that moral views as they related to nuclear weapons were highly polarized. The views among both elite groups were decidedly weighted toward the disagree end of the scale.

Following the same methods previously used, we combined responses to the two statements to form a moral index in which one represented beliefs that nuclear weapons are justifiable in the interests of peace, and seven represented beliefs that nuclear weapons do not contribute to peace and are not justifiable. We used the index as the independent variable in separate bivariate regressions in which composite perceptions of nuclear weapons risks and benefits were the dependent variables. Table 6.17 reports regression results for nuclear risks, and Table 6.18 reports results for nuclear benefits.

Table 6.17 Relating Moral Beliefs to the Composite Nuclear Weapons Risk Index (Bivariate Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	4.11	+.18	6.54	<.0001	.04
Legislators 1997	4.00	+.32	8.79	<.0001	.12
Public 1997	4.95	+.18	7.80	<.0001	.04

Table 6.18 Relating Moral Beliefs to the Composite Nuclear Weapons Benefit Index (Bivariate Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	7.36	−.45	−13.87	<.0001	.15
Legislators 1997	8.13	−.48	−12.45	<.0001	.22
Public 1997	7.13	−.10	−4.28	<.0001	.01

We found clear and systematic relationships between moral beliefs and perceptions of nuclear weapons risks and benefits. Relationships were highly statistically significant across all three groups both for nuclear risks and nuclear benefits. As beliefs increased that nuclear weapons are unjustifiable and that the world would have been a safer place if they had never been invented, perceptions of nuclear weapons risks increased and perceptions of nuclear weapons benefits decreased. Explanatory power was greatest among the two elite groups when the index was used to predict perceptions of nuclear benefits. Among the scientist group, the moral index predicted 15 percent of variation in perceptions of nuclear weapons benefits and among the legislator group, it predicted 22 percent of variation in benefit perceptions. Next we investigated the relationship between the moral index and individual nuclear security policy choices. Table 6.19 summarizes results.

Table 6.19 Relating Moral Beliefs to Nuclear Weapons Policy
(Bivariate Regression Coefficients: *p <.05 **p <.01 ***p <.001)

Moral Index vs. Issues	Scient. 97	Leg. 97	Public 97
1-29. Feasibility of eliminating all nuclear weapons [1 = Strongly Disagree — 7 = Strongly Agree]	+.50***	+.56***	+.40***
1-31. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]	–.76***	–.83***	–.28***
1-23. Minumum acceptable number of US nuclear weapons [1 = 7,000–6,500, with decreasing increments of 500 to 15 = 0]	+.55***	+.92***	+.19**
1-35. Spending for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	–.26***	–.33***	–.11***
1-39. Spending for sustaining US nuclear weapons infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	–.35***	–.43***	–.14***
1-26. US participation in a treaty banning all nuclear test explosions [1 = Strongly Oppose — 7 = Strongly Support]	+.33***	+.51***	+.20***
1-27. US participation in a treaty banning production of fissile materials for nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	+.44***	+.54***	+.24***

Of the various dimensions of belief systems thus far tested in this study, moral beliefs have been the most systematically related to nuclear weapons policy and investment preferences. Notice the consistency of direction for each relationship shown above among members of each group, and notice also the high degree of statistical significance associated with each relationship. As beliefs increased that nuclear weapons do not contribute to peace and cannot be justified, the importance of retaining US nuclear weapons and support for investments associated with nuclear weapons decreased, while support increased for arms control initiatives, reductions in the numbers of nuclear weapons, and perceptions that all nuclear weapons can be eliminated. This index reflected a dimension of respondents' beliefs that may prove to be highly relevant to future debate about nuclear security issues.

One important aspect that is somewhat muted in the above regressions is the bimodal distribution pattern we found among responses from the general public to the component statements of the moral index. Those patterns, shown in Figures 6.9 and 6.10, suggest the potential for a greater degree of polarization among the general public than among the two elite groups regarding moral considerations relating to nuclear weapons issues.

Section 6.6: Beliefs about Nature

THE FINAL ASPECT OF BELIEF SYSTEMS FOR WHICH WE HAVE DATA IN THIS study relates to the way in which respondents perceived nature and the environment. The issues posed by managing nuclear materials and weapons are sensitive to beliefs about the roles, relationships, and responsibilities of humankind toward nature and the earth's ecosystems. In order to examine how these kinds of beliefs may be related to views about nuclear security, we asked the following two questions.

- On a scale where one means that nature is *fragile and easily damaged,* and seven means nature is *robust and not easily damaged,* how do you view nature? (3-27)

- On a scale where zero means that the world's environment is *not at all threatened,* and ten means that the world is on the brink of *environmental disaster,* how do you assess the current state of the world's environment? (3-28)

Response distributions and means are shown in Figures 6.11 and 6.12.

Figure 6.11

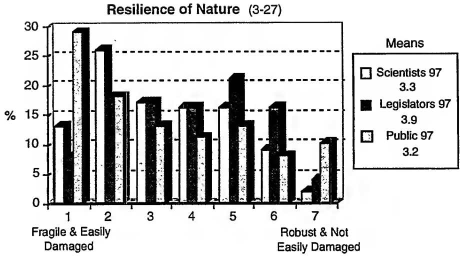
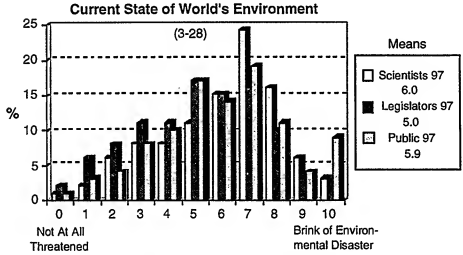


Figure 6.12



Response patterns indicated that the legislator group perceived nature to be substantially less vulnerable and the environment to be much less threatened than did either the scientist or general public groups.[4] For both questions, differences in means were highly statistically significant between the legislator group and each of the other two groups ($p < .0001$ for each pairing and each question). Differences in mean responses from the scientists and the general public were not statistically significant for either question.

To see if these beliefs about nature and the environment were related to perceptions of nuclear weapons risks and benefits, we combined responses from both questions to form an ideology of nature index for which zero represents the belief that nature is highly resilient and the world's environment is not at all threatened, and ten reflects the view that nature is fragile and vulnerable and that the world is on the brink of environmental disaster.[5] The index was then used as the independent variable in bivariate regressions to predict perceptions of nuclear weapons risks and benefits. Results are presented in Tables 6.20 and 6.21.

Table 6.20 Relating Ideology of Nature to the Composite Nuclear Weapons Risk Index (Bivariate Regressions)

Composite Nuclear Risk Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	3.50	+.19	10.39	<.0001	.09
Legislators 1997	3.83	+.21	8.70	<.0001	.12
Public 1997	4.55	+.19	9.58	<.0001	.07

Table 6.21 Relating Ideology of Nature to the Composite Nuclear Weapons Benefit Index (Bivariate Regressions)

Composite Nuclear Benefit Index	Intercept	Coefficient (Slope)	T Value	P Value	Adjusted R^2
Scientists 1997	7.06	−.16	−7.01	<.0001	.04
Legislators 1997	8.19	−.28	−10.51	<.0001	.17
Public 1997	7.00	−.05	−2.37	.0177	<.01

Our ideology of nature index was significantly related to composite perceptions of nuclear weapons risks among all three respondent groups. As beliefs in the vulnerability of nature increased, perceptions of combined nuclear weapons risks increased and perceptions of combined nuclear weapons benefits decreased. The ideology of nature index exhibited modest explanatory power.

Table 6.22 reports results of separate bivariate regressions using the ideology of nature index to predict preferences for our previously used policy and spending issues.

Table 6.22 Relating Ideology of Nature to Nuclear Weapons Policy
(Bivariate Regressions)

Ideology of Nature vs. Issues	Scient. 97	Leg. 97	Public 97
1-29. Feasibility of eliminating all nuclear weapons [1 = Strongly Disagree — 7 = Strongly Agree]	+.23***	+.36***	+.17***
1-31. Importance of retaining US nuclear weapons [0 = Not At All Important — 10 = Extremely Important]	–.20***	–.44***	–.13***
1-23. Minimum acceptable number of US nuclear weapons [1 = 7,000–6,500, with decreasing increments of 500 to 15 = 0]	+.33***	+.62***	n. s.
1-35. Spending for developing and testing new nuclear weapons [1 = Substantially Decrease — 7 = Substantially Increase]	–.12***	–.23***	–.09***
1-39. Spending for sustaining US nuclear weapons infrastructure [1 = Substantially Decrease — 7 = Substantially Increase]	–.13***	–.27***	–.09***
1-26. US participation in a treaty banning all nuclear test explosions [1 = Strongly Oppose — 7 = Strongly Support]	+.24***	+.41***	+.08**
1-27. US participation in a treaty banning production of fissile materials for nuclear weapons [1 = Strongly Oppose — 7 = Strongly Support]	+.29***	+.40***	+.10***

As expected, beliefs about nature and the environment were systematically related to preferences for nuclear weapons policies and investments among all three groups. Directions and significance of relationships were consistent across the groups. The single exception was that the ideology of nature index was not related to preferences about the minimum size of the nuclear stockpile among respondents from the general public. Beliefs that nature is fragile and easily damaged and that the world's environment is seriously endangered were positively related to agreement that it is feasible to eliminate all nuclear weapons and to support for nuclear arms control issues. Such views about nature and the environment were negatively related to the perceived importance of nuclear weapons and spending for nuclear weapons support.

Section 6.7: Relating Dimensions of Belief Systems

In this chapter we used rough and imperfect indicators to investigate relationships between hypothesized components of individual beliefs and perceptions of nuclear weapons risks and benefits and selected nuclear weapons policy and spending issues. Because belief systems are complex and multidimensional, it is very difficult to isolate and categorize components. For example, the generalized measure of political ideology reported in section one of this chapter is very likely an amalgam of political, social, economic, and other aspects of integrated beliefs. In fact, critics have frequently pointed to the limitations of expressing individual ideology on a unidimensional left–right scale.[6] For these and other reasons, we attempted to enrich our understanding of the implications of multiple dimensions of ideology for nuclear security issues. If our assumptions about the interrelated nature of beliefs are accurate, we should find that the individual dimensions of beliefs addressed here are also related to one another and to the broadest indicator—political ideology—expressed on a liberal–conservative spectrum.

To determine if our indicators of different dimensions of beliefs were interrelated as expected, we calculated correlations among the component measures. Results are shown for each of the three 1997 respondent groups in Tables 6.23–6.25.

Table 6.23 Belief System Correlations: American Men and Women of Science

Scien. 97	Political Ideology	Social Index	Index of Interna.	Moral Index	Ideol. of Nature	Income Redistr.	Trade Restric.
Political Ideology	—						
Social Index	−.46	—					
Index of Interna.	−.41	+.32	—				
Moral Index	−.29	+.38	+.23	—			
Ideol. of Nature	−.33	+.27	+.27	+.26	—		
Income Redistr.	−.46	+.51	+.28	+.25	+.25	—	
Trade Restric.	+.04	+.05	−.08	+.02	+.14	+.01	—

Table 6.24 Belief System Correlations: State Legislators

Legisla. 97	Political Ideology	Social Index	Index of Interna.	Moral Index	Ideol. of Nature	Income Redistr.	Trade Restric.
Political Ideology	—						
Social Index	−.62	—					
Index of Interna.	−.56	+.39	—				
Moral Index	−.52	+.52	+.36	—			
Ideol. of Nature	−.57	+.54	+.49	+.44	—		
Income Redistr.	−.59	+.60	+.42	+.41	+.44	—	
Trade Restric.	−.15	+.22	+.02	+.14	+.25	+.24	—

Table 6.25 Belief System Correlations: General Public

Public 97	Political Ideology	Social Index	Index of Interna.	Moral Index	Ideol. of Nature	Income Redistr.	Trade Restric.
Political Ideology.	—						
Social Index	−.25	—					
Index of Interna.	−.20	+.10	—				
Moral Index	−.15	+.42	+.09	—			
Ideol. of Nature	−.23	+.15	+.11	+.19	—		
Income Redistr.	−.19	+.42	+.13	+.21	+.08	—	
Trade Restric.	+.04	+.22	−.04	+.13	+.07	+.13	—

As expected, our indicators of beliefs were all interrelated. The strongest correlations were found among the state legislator group, and the weakest were among the general public group. Next we used political ideology as the dependent variable and each of the other measures as independent variables in multiple regressions, the results of which are summarized for each group in Tables 6.26–6.28.

Table 6.26 Relating Political Ideology to Other Beliefs Among Scientists
(Multiple Regressions)

Political Ideology Scientists 97	Coefficient (Slope)	T Value	P Value
	Intercept = 6.18	Adjusted R^2 = .36	
Social Index	−.27	−6.99	<.0001
Internationalism	−.31	−7.88	<.0001
Moral Index	−.07	−2.43	.0152
Ideology of Nature	+.16	+5.29	<.0001
Income Redistribution	−.17	−8.23	<.0001
Trade Restrictions	+.06	+2.13	.0334

Table 6.27 Relating Political Ideology to Other Beliefs Among Legislators (Multiple Regressions)

Political Ideology Legislators 97	Coefficient (Slope)	T Value	P Value
	Intercept = 6.99	Adjusted R^2 = .57	
Social Index	–.25	–5.36	<.0001
Internationalism	–.35	–6.96	<.0001
Moral Index	–.16	–4.64	<.0001
Ideology of Nature	+.20	+4.70	<.0001
Income Redistribution	–.17	–6.26	<.0001
Trade Restrictions	n.. s.	n.. s.	n. s.

Table 6.28 Relating Political Ideology to Other Beliefs Among the General Public (Multiple Regressions)

Political Ideology General Public 97	Coefficient (Slope)	T Value	P Value
	Intercept = 5.08	Adjusted R^2 = .14	
Social Index	–.16	–5.72	<.0001
Internationalism	–.19	–5.31	<.0001
Moral Index	n. s.	n. s.	n. s.
Ideology of Nature	+.20	+6.50	<.0001
Income Redistribution	–.05	–2.86	.0044
Trade Restrictions	+.08	+3.55	.0004

Within each respondent group, most measures of component beliefs were significantly related to the conventional measure of political ideology. Relationships were most systematic among the scientist group, where the six component measures accounted for 36 percent of the variation in political ideology. Relationships were strongest among the state legislator group, where all of the components except "trade restrictions" were significantly related, and together they explained 57 percent of the variation in political ideology. Relationships were somewhat weaker among the general public group, and together they explained 14 percent of variation in the broader ideology measure. Increasing political conservatism was negatively related to communitarian beliefs, preferences for greater international integration, beliefs that nuclear weapons are not justifiable, and support for income redistribution. Increasing conservatism was positively related to beliefs that nature is resilient and that the environment is not approaching a crisis stage and to preferences for increased trade restrictions. Within each group, substantial portions of the variation in political ideology were not accounted for by the component measures. We hypothesize that the commonly used liberal–conservative continuum may be measuring an additional political component and/or other types of beliefs.

These relationships illustrate how beliefs have multiple dimensions, and how, as a general measure, political ideology may be augmented by inquiries designed to illuminate some of the components that interact within complex belief systems.

Section 6.8: Summarizing Belief Systems and Nuclear Security

OUR DATA ILLUSTRATE THAT MULTIPLE DIMENSIONS OF BELIEF SYSTEMS were importantly related to views about nuclear security. Key findings include the following.

- *Political Beliefs:* Self-identified political ideology was significantly related to perceptions of domestic nuclear risks among all three groups, but only tenuously related to perceptions of external nuclear risks. Political ideology and perceptions of external and domestic nuclear benefits were systematically related among all three groups. Political ideology exhibited a strong and consistent relationship to nuclear weapons policy and spending issues among each of the seven groups surveyed in this project since 1993, including three scientific communities, legislators from all 50 states, and three national samples of the general public measured over time. For all groups and issues, as self-identified political conservatism increased, perceptions of nuclear risks tended to decrease, and perceptions of nuclear benefits tended to increase. Increasing conservatism also was highly related to increasing valuations of nuclear weapons capabilities and increasing support for a variety of nuclear weapons policies and investments.

- *Social Beliefs:* Our composite social index reflected a spectrum of social policy preferences from more individualistic to more communitarian. As communitarian beliefs increased, perceptions of nuclear weapons risks tended to increase and perceptions of nuclear weapons benefits tended to decrease. Support for arms control and concurrence with the premise that it is feasible to eliminate all nuclear weapons increased with higher values on the social index (greater communitarian preferences), while support for investments in nuclear infrastructure increased with stronger individualistic preferences.

- *Economic Beliefs:* We employed two questions that reflected different dimensions of economic beliefs. One inquiry was about income redistribution, and the other was about trade policy. Both were related to perceptions of nuclear risks and benefits, but neither provided large explanatory power. As preferences for income redistribution increased and as preferences for greater trade restrictions increased, perceptions of nuclear risks tended to increase. Perceptions of nuclear benefits tended to decrease with increasing preferences for income redistribution and to increase with preferences for trade restrictions. The two measures of economic beliefs were generally consistently related to policy and spending preferences across respondent groups, but in some cases, relationships did not reach statistical significance among the legislator and general public groups. Both indicators were most consistently related to policy preferences among the scientist group, where preferences for increasing income redistribution and decreasing trade restrictions were related to preferences for lower numbers of nuclear weapons and decreased investments in nuclear infrastructure.

- *Beliefs about Internationalism:* Combining three measures of preferences for differing degrees of integration within the international community, we created an index of internationalism that was related to perceptions of nuclear risks and benefits and to nuclear policy issues. As preferences for international political integration increased, perceptions of nuclear weapons risks tended to increase and perceptions of nuclear weapons benefits tended to decrease. The importance of retaining US nuclear weapons was related to lower values on the index of internationalism, as was support for investments in nuclear weapons infrastructure. With higher values on the internationalism index, support increased for fewer nuclear weapons and for participation in treaties to prevent nuclear testing and to end the production of fissile materials that could be used in nuclear weapons.

- *Moral Beliefs:* By combining responses to two questions about whether the world would have been safer without nuclear weapons and whether moral justification can exist for the employment of nuclear weapons, we created an index that was strongly and systematically related to perceptions of nuclear weapons risks, benefits, and policy preferences. As values on the morality index increased (agreement that the world would have been safer without nuclear weapons and that the respondent could never justify launching nuclear weapons against an enemy), concurrence with the premise that it is feasible to eliminate all nuclear weapons increased, perceived importance of US nuclear weapons decreased, and support for nuclear weapons investments decreased. Relationships were highly significant and very consistent across all three respondent groups.

- *Beliefs about Nature:* By combining responses to two statements about the resilience of nature and the endangerment of the environment, we created an ideology of nature index that was highly predictive of respondent views about nuclear security. As index values increased (perceptions that nature is robust and not easily damaged and that the environment is not endangered), perceptions of nuclear weapons risks tended to decrease and perceptions of nuclear weapons benefits tended to increase. Support for higher numbers of nuclear weapons and investments in nuclear weapons infrastructure increased with higher index values, while support decreased for arms control and the premise that eliminating all nuclear weapons is feasible. Relationships were highly systematic across all groups.

- *Integration of Belief Systems:* We found that each of the above dimensions of beliefs were correlated with one another, and that the broader measure of political ideology was systematically related to each of the more specific subdimensions of beliefs. For the legislators, the subdimensions explained more than half of the variation in political ideology, and for the scientists they explained more than one-third of variation in the broader measure. Within the general public group, the subdimensions explained about 14 percent of variation in political ideology. We hypothesize that the traditional left–right political spectrum used to measure political ideology may include political or other factors that were supplemental to the subdimensions we measured.

In the final chapter, we turn our attention away from nuclear security issues to examine views about two other types of policy: national infrastructure vulnerability and national science policy.

End Notes

[1] Melvin J. Hinich and Michael C. Munger, 1996, *Ideology and the Theory of Political Choice,* Ann Arbor, MI: University of Michigan Press, identified three broad classification categories that authors have used for conceptualizing ideology. In the first, ideologies are seen as collections of ideas with intellectually derivable normative implications for behavior and for how society should be organized. Among others, this view has been expressed by the following: (1) Philip E. Converse, 1964, "The Nature of Belief Systems in Mass Publics," in *Ideology and Discontent,* David E. Apter, ed., New York: The Free Press of Glenco; (2) Robert Higgs and Charlotte Twight, 1987, "National Emergency and the Erosion of Private Property Rights," *Cato Journal* 6:747–73; (3) James Reichley, 1981, *Conservatives in an Age of Change: The Nixon and Ford Administrations,* Washington, DC: Brookings; (4) Douglass North, 1981, *Structure and Change in Economic History,* New York: Norton; and (5) George C. Lodge, 1976, *The New American Ideology,* New York: Knopf.

In a second classification category, ideologies are seen as economizing devices by which individuals understand and express ideas about politics. Among those expressing this view have been: (1) Robert Higgs, 1987, *Crisis and Leviathan: Critical Episodes in the Growth of American Government,* New York: Oxford University Press; (2) James Enelow and Melvin Hinich, 1984, *The Spatial Theory of Voting,* New York: Cambridge University Press; (3) Roger Congleton, 1991, "Ideological Conviction and Persuasion in the Rent-Seeking Society," *Journal of Public Economics,* 44:65–86; (4) Douglass North, 1994, "Economic Performance Through Time," *American Economic Review,* 84:803–32; (5) Roy C. Macridis, 1980, *Contemporary Political Ideologies: Movements and Regimes,* Cambridge, MA: Winthrop; and (6) Anthony Downs, 1957, in his seminal book *An Economic Theory of Democracy,* New York: Harper and Row.

In a third classification category, ideologies are seen as dogmatic belief systems by which individuals interpret, rationalize, and justify behavior and institutions. This view has been expressed by: (1) Reo M. Christenson, Alan S. Engel, Dan N. Jacobs, Mostafa Rejai, and Herbert Waltzer, 1975, *Ideologies and Modern Politics,* New York: Dodd, Mead and Co.; (2) William Domhaff, 1983, *Who Rules America Now?* Englewood Cliffs, NJ: Prentice-Hall; (3) David Jovrasky, 1970, *The Lysenko Affair,* Cambridge, MA: Harvard University Press; (4) Douglass North, 1990, *Institutions, Institutional Change, and Economic Performance,* New York: Cambridge University Press; and (5) Giovanni Sartori, 1969, "Politics, Ideology, and Belief Systems," *American Political Science Review,* 63:398–420.

[2] This question was not asked in 1993.

[3] This question was not asked in 1993.

[4] The potential effects of response bias among the legislator group (discussed in Chapter One) should be noted. We would expect nature to be perceived as somewhat less robust and for the environment to be perceived as slightly more endangered among the full population of state legislators.

[5] To create the ideology of nature index, we reversed the scale for question 3-27 and converted it from a one to seven scale to be a zero to ten scale by subtracting one, multiplying by ten, and dividing by six. Questions 3-27 and 3-28 were then averaged, ignoring missing values.

[6] For critical discussions of the limitations of a unidimensional left–right scale for measuring political ideology, see (1) Michael R. Coveyou and James Piereson, 1977, "Ideological Perceptions and Political Judgment; Some Problems of Concept and Measurement," *Political Methodology,* 4:77–102; (2) Pamela Johnston and Stanley Feldman, 1981, "The Origins and Meaning of Liberal/Conservative Self-Identifications," *American Journal of Political Science,* 25:617–645; (3) Stanley Feldman, 1988, "Structure and Consistency in Public Opinion: The Role of Core Beliefs and Values," *American Journal of Political Science,* 32:416–440; (4) Norman R. Luttbeg and Michael M. Gant, 1993, "The Failure of Liberal/Conservative Ideology as a Cognitive Structure," *Public Opinion Quarterly,* 49:80–93.

Chapter Seven

Other Strategic Considerations

THE PREVIOUS CHAPTERS DEALT WITH PUBLIC VIEWS ABOUT NUCLEAR dimensions of security. In this final chapter we turn our focus to two tangential areas of strategic considerations. In section one, we report public perceptions of US critical infrastructure vulnerabilities and how our respondents thought responsibilities for protecting national infrastructures should be shared. In the second section, we analyze broad indicators of public attitudes about science, technology, relationships among major sectors of science, and how strategic investments in science should be apportioned.

Section 7.1: Critical Infrastructures

PRESIDENTIAL DECISION DIRECTIVE 39, POLICY ON COUNTERTERRORISM, June 21, 1995, directed assessment of domestic vulnerabilities to terrorism.[1] A key dimension of those vulnerabilities relates to infrastructures that are critical to national security and the integrity of US society. To better understand public views about protecting critical US infrastructures, we included questions designed to illuminate three important aspects:

- Sources of threats to critical infrastructures as a group.
- The degree to which specific infrastructures were perceived to be vulnerable.
- How responsibilities for protecting infrastructures should be apportioned.

Sources of Threats

Understanding public views about which sources of potential threats are perceived to pose the greatest dangers to critical infrastructures as a group can help policy makers understand the level of public awareness about categories of potential threats, and can be useful in helping develop and prioritize protective policies. To gather data about this issue, we provided the following introduction and asked the three subsequent questions.

> *Lead-in:* Our next series of questions deals with critical infrastructures in the US such as telecommunications, electrical power systems, gas and oil supplies and services, banking and finance, transportation systems, water supply systems, emergency services, and continuity of government. First we want to know your perceptions about potential threats to these kinds of infrastructures as a group. On a scale where zero means *no threat*, and ten means *extreme threat,* please rate each of the following as potential threats to critical US infrastructures.
>
> - Significant damage to critical infrastructures resulting from terrorism sponsored by foreign groups or individuals? (2-26)
> - Significant damage to critical infrastructures resulting from terrorism sponsored by US groups or individuals? (2-27)
> - Significant damage to critical infrastructures resulting from natural disasters? (2-28)

Responses from our three respondent groups are summarized in Figures 7.1–7.3.

Figure 7.1

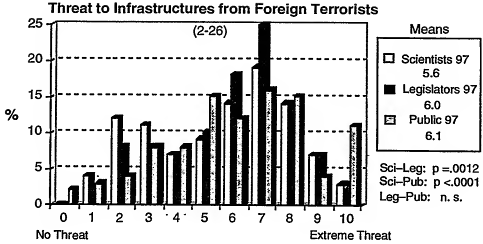


Figure 7.2

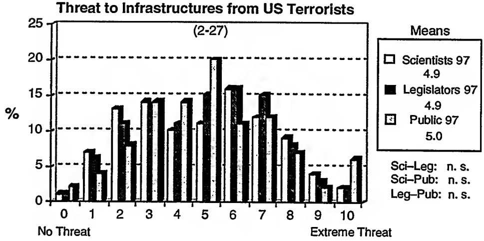
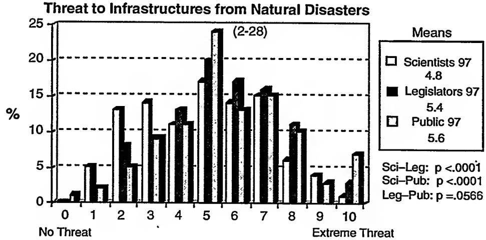


Figure 7.3



All three groups perceived substantial threats to critical infrastructures to exist from each of the three potential sources. All three groups perceived the threat to be greater from foreign terrorists than from domestic terrorists or from natural disasters. Respondents from the general public rated each of the three sources of threats higher than did respondents from either of the two elite groups, and members of the scientist group rated each of the threats lower than either of the other two groups, except for perceived threats from domestic terrorists, which were rated the same by the scientist and legislator groups. Perceptions of the threat from foreign terrorists were significantly different between the scientist group and each of the other two groups. Perceptions of the threat from domestic terrorists were not significantly different among any of the three groups. Perceptions of threats from natural disasters were significantly lower among the scientist group than the other two groups.

Overall Threat

Levels of Threats

NEXT, WE WANTED TO KNOW THE DEGREE TO WHICH SPECIFIC NATIONAL infrastructures were perceived to be vulnerable to all types of terrorism. To better understand the ways members of the public differentiated among key infrastructures in terms of their susceptibilities to terrorist attack, we provided the following lead-in and asked the subsequent questions.

> *Lead-in:* Turning now to individual types of infrastructures, some people have suggested that terrorists might pose physical threats to property and people and electronic threats to computer networks and other technologies. On a scale where zero means *no threat,* and ten means *extreme threat,* please rate the threat that you think terrorists pose to each of the following categories of essential services. Please consider both the *likelihood* of such terrorist acts occurring and their potential *consequences.*
>
> - Telecommunications (such as telephones, television, radio, the Internet, etc.) (2-29)

- Electrical power systems (including generating, transmitting, and distributing electrical power) (2-30)

- Gas and oil supplies and services (including producing, refining, transporting, and distributing petroleum products and natural gas) (2-31)

- Banking and finance (including checking services, credit cards, stock markets, etc.) (2-32)

- Transportation systems (capabilities for all forms of travel, freight shipments, etc.) (2-33)

- Water supply systems (including watersheds, aquifers, water treatment, and water distribution for all purposes) (2-34)

- Emergency services (such as medical, police, fire, and rescue) (2-35)

- Continuity of government (preserving institutions and functions of government) (2-36)

We analyze responses to these eight questions in three ways. First, we present comparative distributions, including mean values for each group and p-values indicating statistical significance of differences in intergroup means. Then we present ordinal rankings of perceived threats from highest to lowest mean value for each of the three groups. Finally, we summarize results of paired t-tests (two tailed) indicating whether the differences in mean responses for each pair within each group were statistically significant.

Figures 7.4–7.11 compare distributions, means, and the statistical significance of differences in means among each of the three 1997 response groups for each of the eight questions. They have been reordered for more efficient discussion.

Figure 7.4

Terrorist Threat to Electrical Power Systems

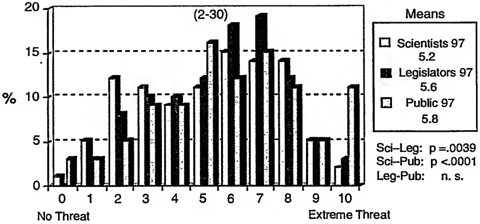


Figure 7.5

Terrorist Threat to Gas & Oil Supplies & Services

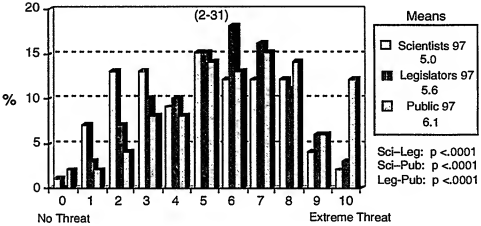
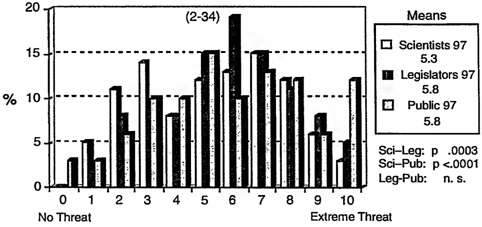


Figure 7.6

Terrorist Threat to Water Supply Systems



Figures 7.4–7.6 show perceptions of terrorist threats to three utility supply systems: electricity, gas and oil, and water. On average, members of the scientist group perceived the threat to be greatest to water supply systems at 5.3, followed by electrical supply systems at 5.2, and gas and oil supplies and services at 5.0. Members of the legislator group also considered the mean threat to water supplies to be greatest at 5.8, followed by the other two utilities rated at 5.6. Respondents from the general public rated mean risks to all three utilities higher than the two elite groups, with the threat to gas and oil supplies and services rated highest at 6.1, followed by the other two utilities at 5.8.

Figures 7.7 and 7.8 show perceptions of threats to telecommunications and to banking and finance services.

Figure 7.7

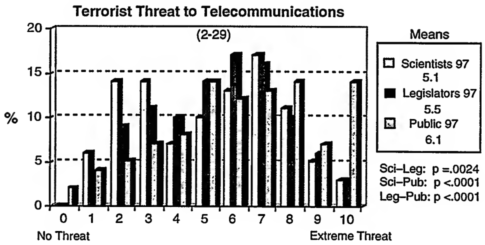
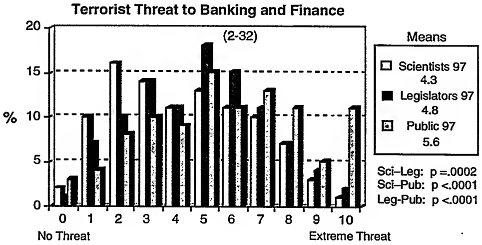


Figure 7.8

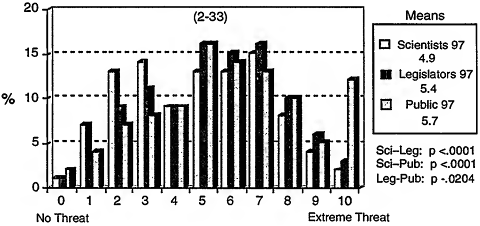


Notice that all three groups rated the mean threat to telecommunications substantially higher than the mean threat to banking and finance, though both are heavily dependent on similar kinds of technologies that may be vulnerable to electronic disruption. One implication is that all three groups may have perceived the consequences of such attacks to telecommunications to be more debilitating than attacks on banking and finance. Again respondents from the general public rated the mean threats of terrorism to each higher than did either of the elite groups. Intergroup differences in responses to both questions were highly statistically significant.

As shown in Figure 7.9, there were large differences in perceptions of threats to transportation.

Figure 7.9

Terrorist Threat to Transportation Systems



Respondents from American Men and Women of Science rated the threat to transportation at 4.9, while responding legislators placed it at 5.4, and members of the general public group rated it highest at 5.7. Though differences in means among all three groups were statistically significant, they were most significant between the scientist group and the other two groups.

Our last two graphs in this series show perceptions of the threat terrorism poses to emergency services in Figure 7.10, and to the continuity of government in Figure 7.11.

Figure 7.10

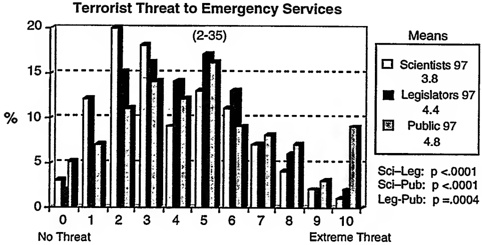
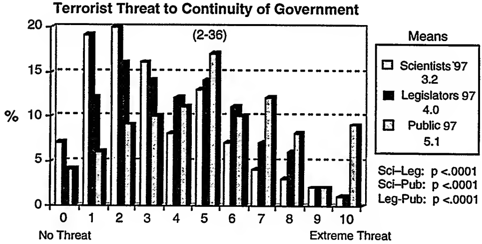


Figure 7.11



As in all the other comparisons, respondents from the general public rated the threat to both categories highest at a mean of 4.8 for emergency services and 5.1 for continuity of government. Also similar in pattern to previous scores, the scientist group rated both lower than either of the other groups at 3.8 for emergency services and 3.2 for continuity of government. Intergroup differences in means were highly statistically significant for both questions.

Next we show the ordinal rankings within each of the respondent groups of their mean perceptions of threats posed by terrorism to the eight critical infrastructures. Figures 7.12–7.14 provide the rankings.

Figure 7.12

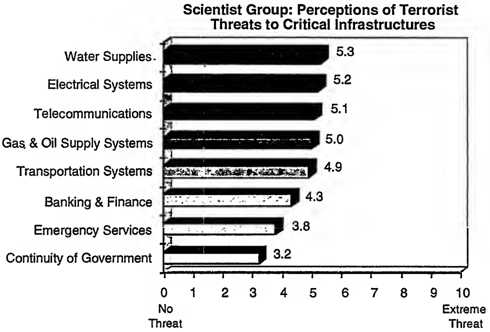


Figure 7.13

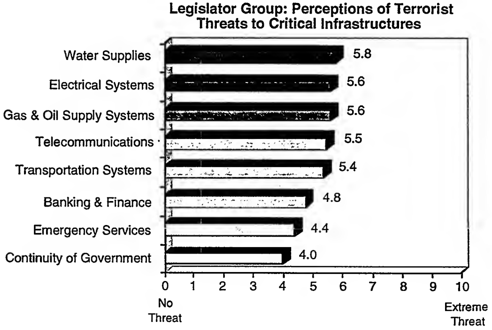
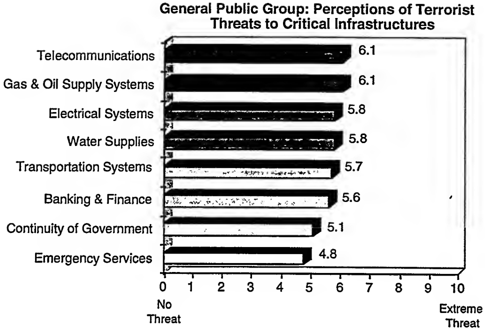


Figure 7.14



Though differences existed in their exact order, the four types of infrastructures perceived by all three groups to be most threatened by terrorism were the three utilities—water supplies, electrical systems, and gas and oil supplies—plus telecommunications. The two classes of infrastructures perceived to be least threatened by terrorism were emergency services and continuity of government. Banking and financial services and transportation systems were placed between the upper and lower classifications by all three groups.

Significant Differences?

Because it can be difficult to assess relatively small numerical differences in means among large groups, and because several of the infrastructures were rated similarly on average, we performed two-tailed t-tests on each possible combination of paired infrastructures to assess statistical significance of differences in means. Table 7.1 shows each paired comparison for each group. The difference in means shown were obtained by subtracting the perceived threat to the second infrastructure from that of the first listed in each pair. Statistical significance of each difference in pairs is shown using the same convention used in previous chapters.

Table 7.1 Paired Comparisons of Critical Infrastructures: Statistical Significance of Differences in Means (Two-Tailed t-Tests)
(*p <.05 **p <.01 ***p <.001)

PAIRED COMPARISONS	SCIENTISTS 1997	LEGISLATORS 1997	PUBLIC 1997
Telecom – Electrical Systems	–.14**	n. s.	+.29***
Telecom – Oil & Gas Systems	+.14*	n. s.	n. s.
Telecom – Banking & Finance	+ 77***	+.69***	+.53***
Telecom – Transportation Systems	+.20***	n. s.	+.39***
Telecom – Water Supplies	–.23***	–.31***	+.28***
Telecom – Emergency Services	+1.32***	+1.13***	+1.32***
Telecom – Continuity of Government	+1.85***	+1.49***	+1.07***
Electrical – Oil & Gas Systems	+.28***	n. s.	–.31***
Electrical – Banking & Finance	+.91***	+.79***	+.23***
Electrical – Transportation Systems	+.35***	+.16*	n. s.
Electrical – Water Supplies	n. s.	–.20**	n. s.
Electrical – Emergency Services	+1.46***	+1.24***	+1.03***
Electrical – Continuity of Government	+2.00***	+1.59***	+.77***
Oil & Gas – Banking & Finance	+.63***	+.79***	+.54***
Oil & Gas – Transportation Systems	n. s.	+.15*	+.41***
Oil & Gas – Water Supplies	–.36***	–.20**	+.31***
Oil & Gas – Emergency Services	+1.18***	+1.24***	+1.33***
Oil & Gas – Continuity of Gov't.	+1.72***	+1.59***	+1.08***
Bank. & Finance – Transportation	–.57***	–.63***	n. s.
Bank. & Finance – Water Supplies	–1.00***	–.99***	–.23**
Bank. & Finance – Emer. Services	+.55***	+.45***	+.79***
Bank. & Finance – Contin. of Gov't.	+1.08***	+.80***	+.56***
Transportation – Water Supplies	–.43***	–.35***	n. s.
Transportation – Emer. Services	+1.12***	+1.08***	+.92***
Transportation – Continuity of Gov't.	+1.66***	+1.44***	+.67***
Water Supplies – Emer. Services	+1.55***	+1.44***	+1.03***
Water Supplies – Continuity of Gov't.	+2.08***	+1.79***	+.77***
Emer. Services – Continuity of Gov't.	+.53***	+.35***	–.25***

These comparisons illustrate that, with few exceptions, the relatively small differences in means among critical infrastructures were statistically significant. Of course, given the large sample sizes, even relatively small systematic differences can be statistically significant. Nevertheless, this implies that respondents in each group were distinguishing among different perceptions of threat levels posed by terrorism to different infrastructures.

Apportioning Responsibility

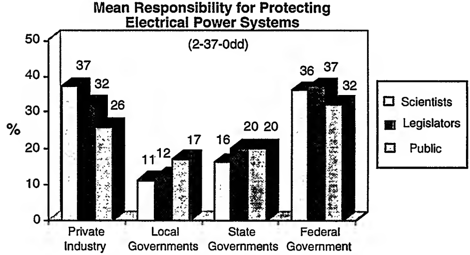
In our third line of inquiry, we sought insights about how elites and members of the general public thought responsibilities for protecting critical US infrastructures should be apportioned among different levels of government and the private sector. To gather that information, we asked respondents to assign a percentage of responsibility for protecting six of the eight critical infrastructures to federal, state, and local governments and to private industry.

The demanding nature of such questions and the difficulty of administering them by phone for the survey of the general public required that we limit the numbers of questions asked of each participant. We correctly hypothesized that continuity of government and emergency services would be perceived as having the lowest relative threats from terrorism among the eight classes of critical infrastructures; therefore we eliminated them from the apportionment task. We asked half of our respondents to apportion responsibility for protecting banking and finance, water supply systems, and transportation systems. The other half was asked to apportion responsibility for the remaining three infrastructure categories: electrical power systems, telecommunications, and gas and oil supplies and services. Each of the two lists of three infrastructures was randomly assigned to respondents in the mail and telephone surveys. The components of each list also were randomly ordered in the telephone survey. Respondents were asked to keep the total apportionment for each infrastructure category to a value of 100 percent. The lead-in to each set of three infrastructures was as follows:

Lead-in: Now we want you to consider who should be responsible for protecting these kinds of essential services in the US if terrorists *do* pose a threat. Please consider four parties that might have some level of responsibility: the federal government, state governments, local governments, and private industry. Please approximate what percent of the total responsibility, if any, should be assumed by each of these four parties for protecting each of the following three sectors.

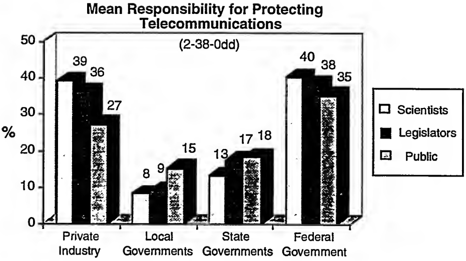
Mean apportionments by each of the respondent groups are summarized for each of the six infrastructure categories in Figures 7.15–7.20. (Totals do not always add to 100 percent because of rounding, and because some respondents may not have used their full allocation or may have assigned some responsibility to a category of "other.")

Figure 7.15



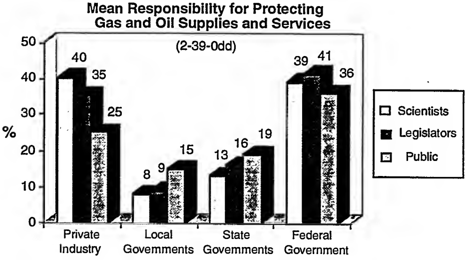
ANOVAS	Pvt. Industry	Local Govts.	State Govts.	Fed. Govt.
Sci. vs. Leg.	p =.0027	n. s.	p =.0001	n. s.
Sci. vs. Public	p <.0001	p <.0001	p <.0001	p =.0021
Leg. vs. Public	p <.0001	p <.0001	n. s.	p =.0051

Figure 7.16



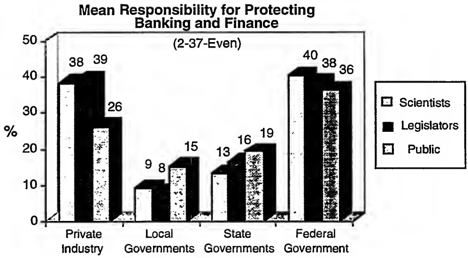
ANOVAS	PVT. INDUSTRY	LOCAL GOVTS.	STATE GOVTS.	FED. GOVT.
Sci. vs. Leg.	p =.0244	n. s.	p <.0001	n. s.
Sci. vs. Public	p <.0001	p <.0001	p <.0001	p <.0001
Leg. vs. Public	p <.0001	p <.0001	n. s.	p =.0254

Figure 7.17



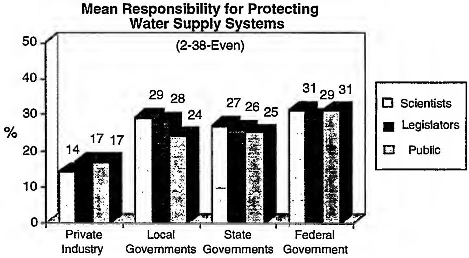
ANOVAS	PVT. INDUSTRY	LOCAL GOVTS.	STATE GOVTS.	FED. GOVT.
Sci. vs. Leg.	p =.0023	n. s.	p =.0111	n. s.
Sci. vs. Public	p <.0001	p <.0001	p <.0001	n. s.
Leg. vs. Public	p <.0001	p <.0001	p =.0004	p =.0045

Figure 7.18



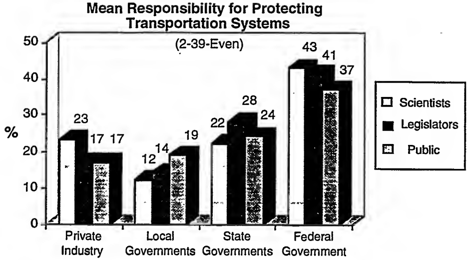
ANOVAS	Pvt. Industry	Local Govts.	State Govts.	Fed. Govt.
Sci. vs. Leg.	n. s.	n. s.	p =.0042	n. s.
Sci. vs. Public	p <.0001	p <.0001	p <.0001	p =.0050
Leg. vs. Public	p <.0001	p <.0001	p =.0013	n. s.

Figure 7.19



ANOVAS	Pvt. Industry	Local Govts.	State Govts.	Fed. Govt.
Sci. vs. Leg.	p =.0257	n. s.	n. s.	n. s.
Sci. vs. Public	p =.0036	p <.0001	p =.0407	n. s.
Leg. vs. Public	n. s.	p =.0006	n. s.	n. s.

Figure 7.20



ANOVAS	Pvt. Industry	Local Govts.	State Govts.	Fed. Govt.
Sci. vs. Leg.	p <.0001	n. s.	p <.0001	n. s.
Sci. vs. Public	p <.0001	p <.0001	p =.0040	p <.0001
Leg. vs. Public	n. s.	p <.0001	p <.0001	p =.0072

Private vs. Public

Several general tendencies are noteworthy. First, the two elite groups were more willing than respondents from the general public to assign higher levels of responsibility for protecting infrastructures to private industry. In the cases of electrical power systems, telecommunications, gas and oil supplies and services, and banking and finance, the public group thought, on average, that private industry should bear statistically significantly less responsibility for insuring infrastructure integrity than did either the scientist or legislator groups. Also, in each of those same four cases, respondents from the general public thought that local governments should bear significantly more responsibility for protecting the infrastructures than did either of the two elite groups.

Second, all three respondent groups apportioned responsibility for protecting water supply systems and transportation systems much differently than they did for the other four categories of infrastructures. In the case of water supplies, all three groups apportioned responsibility approximately equally among the three levels of government, and assigned substantially less accountability to private industry than for most other infrastructure categories. The highest levels of responsibility assigned to local governments were for protecting water supplies. In the cases both of water supplies and transportation systems, state governments were assigned higher levels of responsibility by all three groups than for the other four infrastructures.

Shared Responsibilities

Finally, note that in each of the six infrastructure categories, respondents from the general public assigned the highest level of accountability to the federal government. That same pattern was not evident among the other two groups. On the other hand, none of the respondent groups assigned much more than 40 percent of the responsibility for protecting critical infrastructures to the federal government. There were no cases in which one of the four potentially responsible entities was overwhelmingly identified as having the sole or primary responsibility for protecting a critical infrastructure. Whether our respondents were trained scientists, or state legislators with vested interests in which level of government has primary responsibility, or members of the general public with only remote connections to deciding such policies, all saw a need for sharing the responsibilities for defending critical US infrastructures among various levels of government and the private sector.

In the next section, we turn our attention to broad impressions and preferences regarding science, technology, and related national policies.

Section 7.2: Science, Technology, and Policy

OUR SURVEYS INCLUDED QUESTIONS ON SCIENCE AND TECHNOLOGY that were designed to provide insight about several policy relevant areas. First, we were interested in comparing how the general public and our two elite groups thought about science and technology in broad philosophical terms, and the degree to which each respondent group placed trust in scientists from various sectors of science. We also analyzed the ways in which respondents from the general public preferred for decisions to be made about new technologies. All of the questions in this section were asked of each of the three respondent groups, and some of the questions had been asked of the general public in our previous studies in this series, making over time comparisons possible.

Second, we wanted to know how our two elite groups thought about relationships between three key sectors of science: academe, federally funded research facilities, and business and industry. Because the distinctions and relationships among different scientific communities may be less apparent to members of the general public, we asked questions in this section only to members of American Men and Women of Science and state legislators.

General Views About Science and Technology

We begin by summarizing responses to a series of statements designed to compare and contrast philosophical beliefs and general attitudes about science that we hypothesize may be related to issues of scientific credibility and public trust in scientists. The lead-in and subsequent statements follow (their order has been changed for analysis).

> *Lead-in:* Using a scale where one means *strongly disagree,* and seven means *strongly agree,* please respond to the following assertions about science.

- Science is the *best* source of reliable knowledge about the world. (2-17)
- In principle, science can eventually explain anything. (2-14)
- The same scientific evidence can almost always be interpreted to fit opposing points of view. (2-15)

- The *results* of scientific research will almost always be significantly affected by the values held by the researcher. (2-16)

Grouped responses are summarized in Figures 7.21–7.24.

Figure 7.21

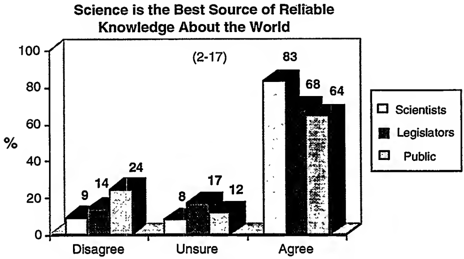
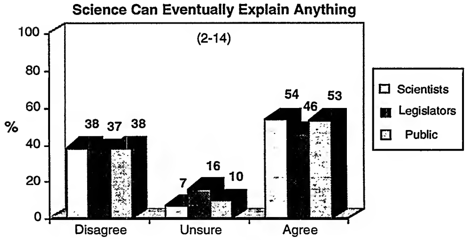


Figure 7.22



While large majorities of all three groups agreed that science is the best source of knowledge about the world, only about half of each group agreed that, in principle, science can eventually explain anything. Scientists were significantly more in agreement with both statements than were either of the other two groups (p <.0001 for each pairing for each question). Intergroup differences were more pronounced for responses to the remaining two statements in this series.

Figure 7.23

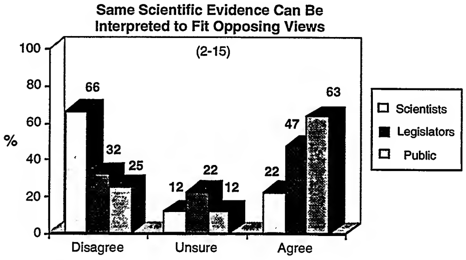
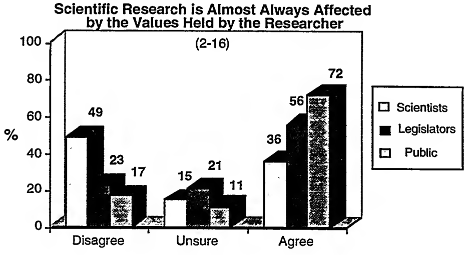


Figure 7.24



When the topic was the objectivity of scientific research, the views of respondents from the general public and from state legislators were dramatically different from those of participating scientists. Notice in Figure 7.23 that the views of the scientist group and the general public group were almost mirror images. Whereas two-thirds of the scientist group disagreed with the assertion that the same scientific evidence can almost always be interpreted to fit opposing points of view, almost two-thirds of respondents from the general public agreed with it. The legislator group was more evenly divided, with 32 percent disagreeing and 47 percent agreeing with the statement. Of course differences in means among all three groups were highly statistically significant ($p <.0001$ for each pairing).

Differences in mean responses to the second statement that scientific research is almost always affected by the values held by the researcher also were highly significant ($p <.0001$ for each pairing), but somewhat less dramatic than for the previous statement. As shown in Figure 7.24, only about one-third of responding scientists agreed with that assertion, while 56 percent of the legislator group and fully 72 percent of participants from the general public agreed with it. Results to these two questions imply a very strong skepticism on the part of lawmakers and the general public about scientific objectivity and neutrality that may have important implications for public policies based on scientific interpretation.

Next we made three inquiries into attitudes about technology. Using the same lead-in and agree–disagree scale described above, we asked participants to respond to the following two statements.

- Technology can solve most of society's problems. (2-18)
- Technology has become dangerous and unmanageable. (2-19)

Results are shown in Figures 7.25 and 7.26.

Figure 7.25

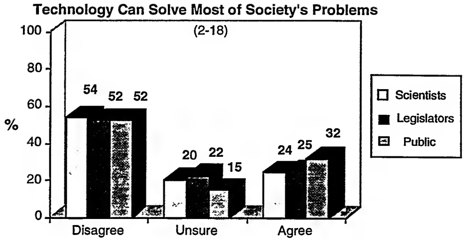
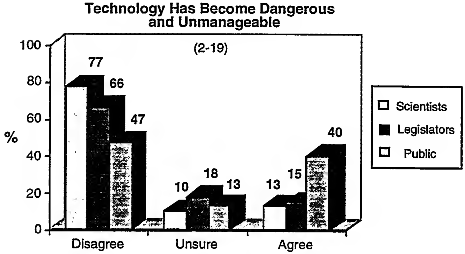


Figure 7.26



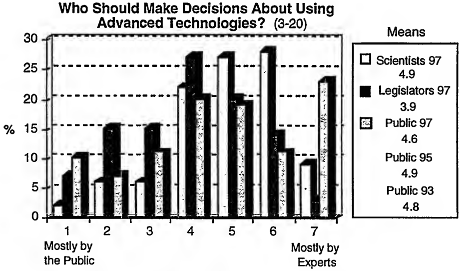
While there was a high level of consistency in disagreeing with the premise that technology can solve most of society's problems, opinion among our respondent groups was quite divided about whether technology has become dangerous and unmanageable. Participating members of American Men and Women of Science overwhelmingly disagreed with that statement, as did two-thirds of the legislator group. However, opinion was more evenly divided among respondents from the general public, with 47 percent disagreeing with the statement and 40 percent agreeing with it. These data indicate a reluctance on the part of our general public respondents to rely too heavily on technological solutions, and some misgivings about the eventual implications for society of some technologies.

Our third question in this series on technology is one that we asked in each of the three studies in this series. It addressed the issue of who should make decisions about applying advanced technologies, and read as follows.

> Some people think that decisions about the applications of advanced technologies, such as genetic engineering or nuclear energy, should be made primarily by the public. Others think that these decisions should be made primarily by technically trained experts. On a scale where one means that such decisions should be made mostly by the *public,* and seven means that such decisions should be made mostly by *experts,* what is your opinion? (3-20)

Results are summarized and compared in Figure 7.27.

Figure 7.27



3-20 ANOVA	Sci 97 Leg 97	Sci 97 Pub 97	Leg 97 Pub 97	Pub 97 Pub 95	Pub 97 Pub 93	Pub 95 Pub 93
p-value	<.0001	<.0001	<.0001	.0005	.0004	n. s.

Our three 1997 respondent groups had very different views about who should make decisions about the application of advanced technologies. The scientist group heavily favored placing such decisions in the hands of technical experts. The general public group also preferred that those kinds of decisions largely be left to the experts. Their modal response was seven. But members of the legislator group, who might normally be involved in making choices about such technologies in the name of the public, favored the public policy process. Differences among each of the three groups were highly statistically significant ($p < .0001$ for each pairing). Even though the general public group in 1997 favored decision making about technical issues to involve experts, the mean score decreased significantly from that reported in both 1993 and 1995.

Controlling Technology

Trust in Scientists

To further explore the issue of public trust in scientists, we asked a series of questions designed to examine differences in perceptions of three major scientific communities: scientists working in academe, those employed in the private sector, and those working at federally funded research laboratories. The lead-in and question series follows.

> *Lead-in:* Using a scale where zero means *no trust,* and ten means *complete trust,* how much trust would you place in each of the following communities of scientists to provide unbiased information about the risks and benefits of new technologies?
>
> - Scientists working in colleges and universities (2-21)
> - Scientists working in national laboratories (2-23)
> - Scientists working in business and industry (2-22)

Results are reported in Figures 7.28–7.30.

Figure 7.28 **Trust in Scientists Working in Colleges & Universities**

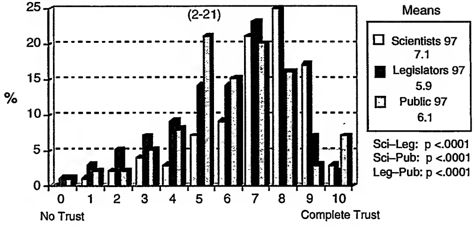


Figure 7.29 **Trust in Scientists Working in National Laboratories**

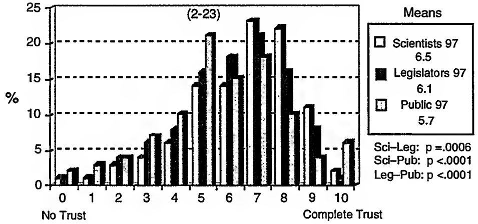
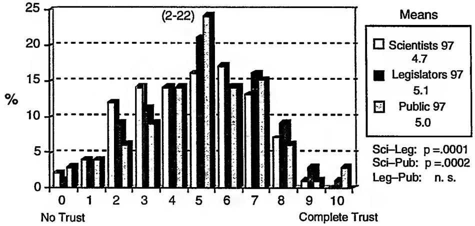
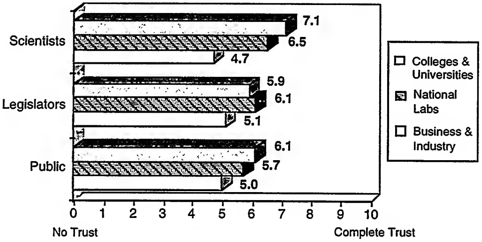


Figure 7.30 **Trust in Scientists Working in Business & Industry**



Note that the distribution pattern for trust in scientists working in business and industry is quite different than for scientists working in either of the other two sectors. Note also that statistically significant differences existed in the degrees to which our three respondent groups trusted scientists within each of the three sectors. (The only exception was the similar rating given by members of the legislator and general public groups to scientists working in the private sector.) To make the relative rankings of scientists across the three sectors more easily comparable, Figure 7.31 shows mean levels of trust for each sector.

Figure 7.31 **Trust in Scientists in Different Sectors** (2:21–2:23)



Respondents from the scientist and general public groups placed their highest mean levels of trust in scientists working in colleges and universities, followed by scientists working in national laboratories. The lowest mean levels of trust among all three respondent groups were identified with scientists working in business and industry. Members of the legislator group rated national laboratories slightly higher, on average, than colleges and universities.

Elite Views of Sector Relationships

In the post-Cold War era, US investments in research and technology are being reprioritized, and in some cases, competition for nondefense investments may be increasing among academic, private, and government sectors. To better understand how such relationships are evolving, we asked a series of questions about research investments and sector relationships to the scientist and legislator groups. These questions were not posed to the general public sample. The questions were of three types. A series on task management asked about the suitability of scientists working in the three major sectors for accomplishing basic research, applied research and development, and application and production. We also asked our respondents to rate each of the three sectors in terms of their suitability for conducting interdisciplinary research. The second set of questions inquired about changes in sector competition and its implications. In the third set, we asked respondents how they thought federal investments should be apportioned among basic research, applied research and development, and application and production.

Task Management

Before asking respondents to rate the suitability of each of the three sectors or communities of scientists for doing specific broad categories of different science management tasks, we defined each functional area. We began with the following lead-in, definition, and questions.

> *Lead-in:* The next several questions ask about categories of research, development, and application. Because these categories sometimes overlap and are not always easy to distinguish, please use the definitions provided with each of the following sets of questions.
>
> - ***Basic research*** is conducted to gain more comprehensive knowledge of the subject under study, with greater priority given to

advancing conceptual understanding than to specific applications of that knowledge.

- Using a scale where one means *very poorly suited,* and seven means *very well suited,* please rate each of the following groups as to their suitability for accomplishing ***basic research.***

- Scientists working in colleges and universities (2-1)

- Scientists working in federally funded major research facilities (such as Los Alamos National Laboratory, National Institute for Science and Technology, Naval Research Laboratory, Oak Ridge National Laboratory, etc.) (2-3)

- Scientists working in business and industry (2-2)

Results are summarized in Figures 7.32–7.35.

Figure 7.32

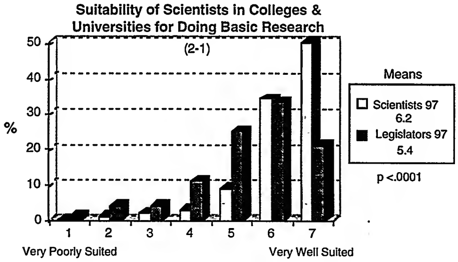


Figure 7.33

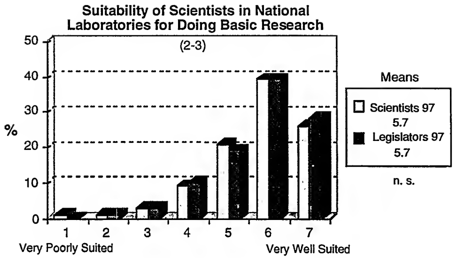


Figure 7.34

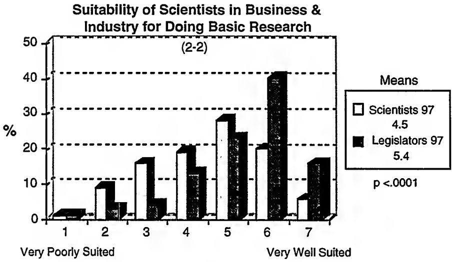
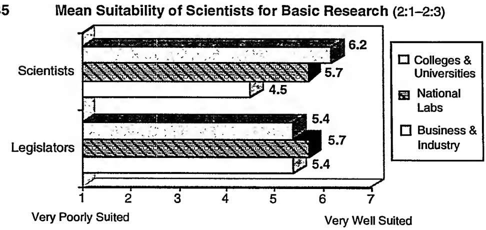


Figure 7.35



Respondents from the American Men and Women of Science considered scientists working in academic environments to be best suited for accomplishing basic research. Participating state legislators rated national laboratories highest. Both groups considered scientists working in the private sector to be least suitable for accomplishing basic research.

Following in the same format, we next asked participants to rate the same sectors of science in terms of suitability for accomplishing applied research and development, which was defined for respondents as follows.

> ***Applied research and development*** is aimed at gaining specific knowledge about the means by which a recognized need may be met, and the systematic use of that knowledge for developing useful materials, devices, systems, or methods, including designing and developing prototypes and processes.

Figures 7.36–7.39 compare responses.

Figure 7.36

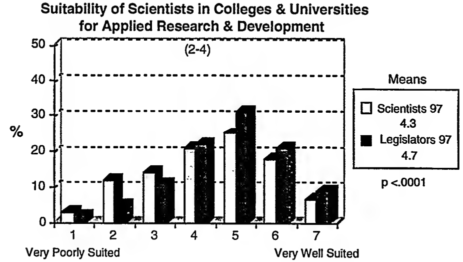


Figure 7.37

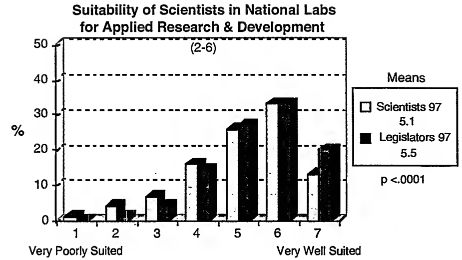


Figure 7.38

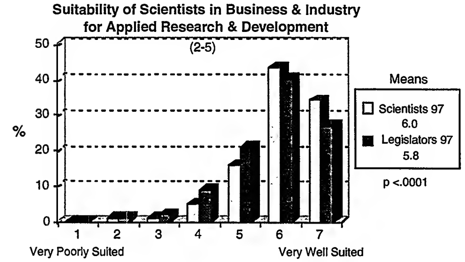
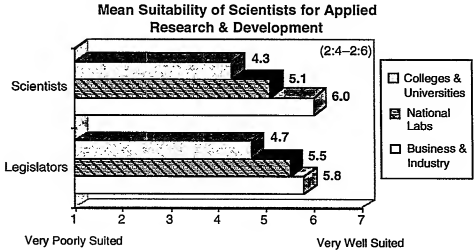


Figure 7.39



Members of both the scientist group and the legislator group rated the business and industry sector as most suitable for accomplishing applied research and development. Also, both considered scientists working in academic environments to be least suitable. National laboratories were rated lower than the private sector, but higher than colleges and universities.

Next we asked participants to rate the suitability of the three sectors for accomplishing application and production, which was defined as follows.

> *Application and production* is the translation of knowledge from applied research and development into production processes and products.

Figures 7.40–7.42 summarize responses.

Figure 7.40

Suitability of Scientists in Colleges & Universities for Application and Production

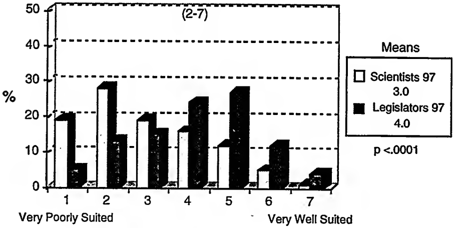


Figure 7.41

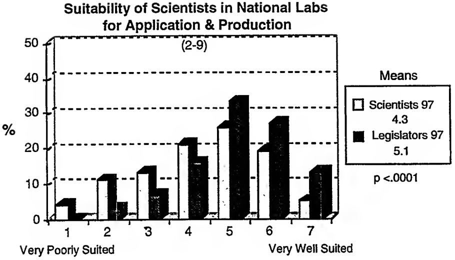


Figure 7.42

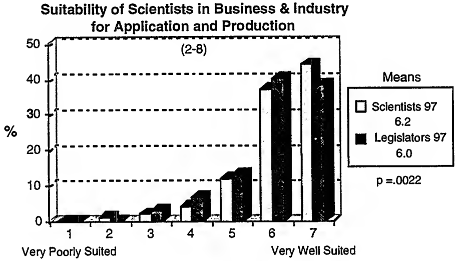
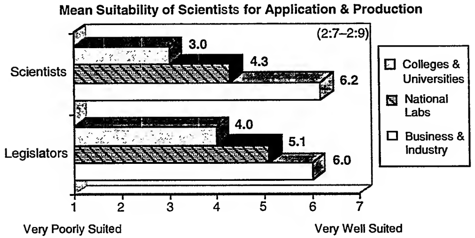


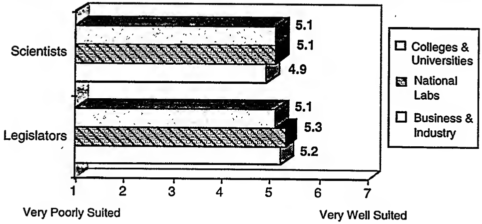
Figure 7.43



Again, both groups rated business and industry highest for accomplishing application and production, and both rated colleges and universities lowest in terms of suitability for these tasks. Views were most dissimilar in the way the two groups rated the suitability of scientists in academic settings for involvement in application and production. The legislator group rated college and university scientists a full point higher than did the scientist group. National laboratories maintained their middle ranking by both elite groups.

Our final question set in this series asked respondents to rate the suitability of scientists working in different sectors for accomplishing interdisciplinary research requiring integrated expertise from multiple scientific fields. Because distributions were similar for both responding groups, multiple graphs are not shown. Figure 7.44 compares means.

Figure 7.44 Mean Suitability of Scientists for Interdisciplinary Research (2:10–2:12)



Both groups considered the three science sectors roughly to be equal in terms of their suitability for conducting interdisciplinary research.

To determine if familiarity with US national laboratory operations influenced the ways in which participating scientists evaluated the suitability of national labs for conducting research, development, and production, we asked members of the scientist group whether they had ever interacted professionally with one or more members of the technical staffs of any Department of Energy (DOE) national laboratory. More than half, 59 percent, indicated that they had interacted professionally with staff members of one or more DOE laboratories, and 41 percent of scientist respondents indicated that they had no previous experience working with someone from a DOE lab. For those who answered affirmatively, we also asked them to identify the national laboratories with which they had interacted professionally. The percent of those acknowledging interactions with one or more of ten national research facilities is shown in Table 7.2.

Table 7.2 Percent of Scientist Respondents Who Have Interacted With National Laboratories

National Research Facilities	Percent Respondents with Professional Interaction
Argonne National Laboratory	27
Brookhaven National Laboratory	20
Lawrence Berkeley National Laboratory	16
Lawrence Livermore National Laboratory	22
National Renewable Energy Laboratory	5
Idaho National Engineering & Environmental Lab	10
Los Alamos National Laboratory	29
Oak Ridge National Laboratory	31
Pacific Northwest National Laboratory	10
Sandia National Laboratories	21
Other Department of Energy facilities	14

Also we asked our scientist respondents to rate their level of personal knowledge about three aspects of nuclear weapons management issues. We asked them to rate their personal knowledge about national security issues. We asked them to rate their scientific knowledge about nuclear weapons technologies. And we asked them to rate their familiarity with the functions of Department of Energy national laboratories involved with developing and managing nuclear weapons technologies. Specific question wording and scales follow.

- On a scale where one means you have *little knowledge* about national security issues, and seven means you have *extensive knowledge*, how would you rate your personal level of understanding of national security issues? (2-42)

- On a scale where one means you have *little scientific knowledge* about nuclear weapons technologies, and seven means you have *extensive scientific knowledge,* how would you rate your personal level of scientific understanding of nuclear weapons technologies? (2-43)

- On a scale where zero means you are *not at all knowledgeable* about the functions of Department of Energy national laboratories involved with developing and managing nuclear weapons technologies, and ten means you are *extremely knowledgeable,* how would you rate your knowledge about the functions of these national laboratories? (2-44)

The first question was asked of all three respondent groups, but the second and third questions were asked only of participants from American Men and Women of Science. Responses are charted in Figures 7.45–7.47.

Figure 7.45 **Knowledge About National Security Issues**

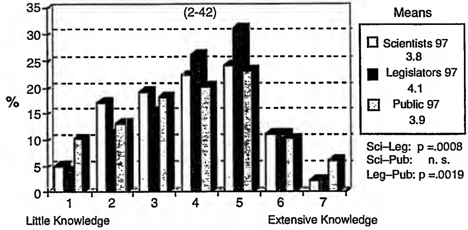


Figure 7.46 **Scientific Knowledge About Nuclear Weapons Technologies**

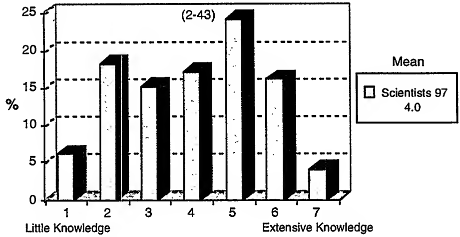
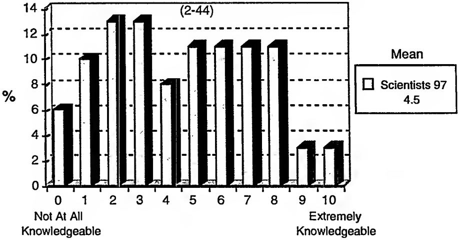


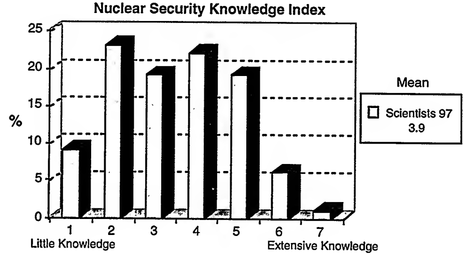
Figure 7.47 **Knowledge About Functions of Nuclear Weapons Labs**



On average, participating scientists rated their personal knowledge about national security issues at about the same level as participants from the general public. The legislator group rated their knowledge significantly higher than either of the other groups. Members of the scientist group placed their knowledge of nuclear weapons technologies and their familiarity of the functions of nuclear weapons laboratories near midscale.

By combining scientists' responses to these three questions, we created an index of self-rated knowledge about nuclear security.[2] Combined results are presented in Figure 7.48 on a scale where one means little knowledge, and seven means extensive knowledge.

Figure 7.48



To determine if scientists' knowledge about national security issues, nuclear weapons technologies, and the functions of nuclear weapons laboratories were related to how they viewed nuclear weapons risks and benefits, we used the nuclear security knowledge index as the independent variable in separate bivariate regressions in which the external and domestic nuclear risk indices and the external and domestic benefit indices were the dependent variables. Results are provided in Table 7.3.

Table 7.3 Relating the Nuclear Security Knowledge Index to Perceptions of Nuclear Weapons Risks and Benefits (Bivariate Regressions)

Dependent Variable	Intercept	Coefficient (Slope)	T Value	P Value	Adj. R^2
External nuclear weapons risk index	5.38	+.07	2.19	.0285	<.01
Domestic nuclear weapons risk index	4.42	−.21	−5.30	<.0001	.02
External nuclear weapons benefit index	5.65	+.21	+5.05	<.0001	.02
Domestic nuclear weapons benefit index	n. s.	n. s.	n. s.	n. s.	n. s.

As self-rated knowledge about national security issues, nuclear weapons technologies, and nuclear weapons labs increased, perceptions of external nuclear weapons risks increased, and perceptions of domestic nuclear weapons risks decreased. Perceptions of external nuclear weapons benefits increased as the nuclear security knowledge index increased, but perceptions of domestic benefits were not systematically related to self-rated knowledge about nuclear security. Explanatory power in each of the statistically significant relationships was small.

Intersector Competition

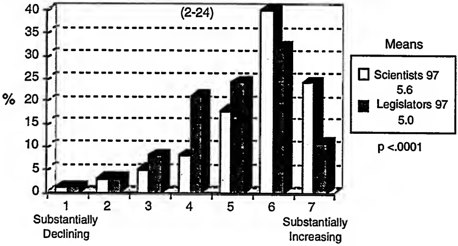
HAS THE POST-COLD WAR SECURITY ENVIRONMENT AND ITS associated reductions in defense expenditures and investments influenced competition for federal research funding among scientists working in academic settings, government agencies, and the private sector? If competition between sectors of science for declining research resources does increase, would the effects be harmful or beneficial? To better understand these issues from the perspectives of scientific and policy making communities, we asked participating scientists and legislators to respond to the following two questions.

- How is competition for federal research funding changing among scientists working in academe vs. those working in government vs. those working in industry? On a scale where one means competition for research resources is *substantially declining,* and seven means competition is *substantially increasing,* please indicate your view of competition for federal research funding among those sectors of science. (2-24)

- On a scale where one is *extremely harmful,* and seven is *extremely beneficial,* how do you think *increased* competition among these three sectors for federal research dollars would affect US national interests? (2-25)

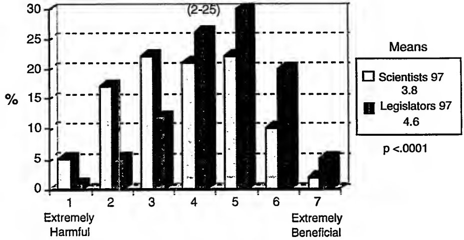
Figures 7.49 and 7.50 summarize responses.

Figure 7.49 **How Competition for Federal Research Funding is Changing**



Both the scientist and legislator groups perceived competition between different sectors of science for federal research funding to be increasing in the post-Cold War era. Participating scientists perceived competition to be increasing significantly more than did respondents from the legislator group.

Figure 7.50 **Effect of Increased Research Competition on National Interests**



The scientist and legislator groups considered the implications of increased competition for federal research resources to produce quite different effects. On average, participating scientists thought increased competition would be harmful to US national interests, while responding legislators considered increased research competition to be beneficial to national interests. The difference in means, which was almost two points on a seven point scale, was highly statistically significant. In this case, we consider such a difference also to be very relevant to science policy.

Investment Preferences

TO DETERMINE HOW PARTICIPATING SCIENTISTS AND LEGISLATORS preferred federal investments in science to be prioritized, we asked them how they thought federal investments should be apportioned for accomplishing basic research, applied research and development, and application and production. Results are displayed in Figures 7.51 and 7.52.

Figure 7.51 **Scientists' Investment Preferences**

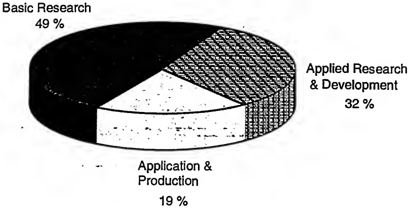
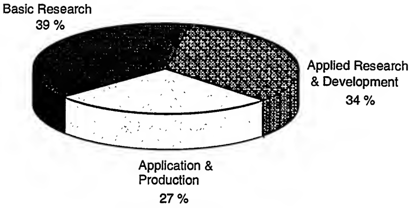


Figure 7.52 **Legislators' Investment Preferences**



Both groups thought that about one-third of federal research dollars should be invested in applied research and development. On average, members of the scientist group preferred to invest more in basic research and less in application and production compared to the legislator group.

Section 7.3: Summarizing Perceptions of Critical Infrastructure Vulnerabilities and Science Policy

Critical Infrastructures

RESPONDENTS TO OUR PUBLIC, LEGISLATOR, AND SCIENTIST SURVEYS ALL perceived US critical infrastructures to be vulnerable to terrorism. When considering the group of eight infrastructures as a whole, respondents from the general public perceived higher levels of vulnerability than did either elite group. All three of the groups surveyed picked the same four categories of infrastructures as having the highest levels of risk of attack (though there were differences in how they were ordered). Water supplies, telecommunications, electrical systems, and gas and oil supply systems were rated highest. All three groups placed transportation and banking and finance as the next most vulnerable infrastructures, and emergency services and continuity of government were ranked least at risk by all three groups. Though differences in mean perceptions of risk were small in the absolute, most were statistically significant, indicating that both elite and general public groups differentiated among perceived vulnerabilities and threats.

Threat

Each of the respondent groups made clear distinctions in the ways in which they thought responsibility for protecting critical infrastructures should be apportioned among different levels of government and the private sector. Both elite groups were more willing to assign higher levels of responsibility to private industry, while the general public group assigned higher levels to the federal government. However, none of the groups thought that the federal government should shoulder all or even the majority of responsibility for protecting any of the infrastructures. Responsibility was divided among federal, state, and local governments and private industry in each case and by each group.

Responsibilities

All groups apportioned responsibility for protecting water supply systems and transportation systems differently than they did for other infrastructures. Responsibility for protecting water supplies were more or less equally divided among the three levels of government, with smaller apportionments going to private industry. Highest levels of responsibility at the local government level were assigned to protecting water supply systems. Highest levels of responsibility at the state government level were assigned for water supplies and transportation systems. For most infrastructures, the federal government and private industry received the highest apportionments, though no single apportionment was much above 40 percent.

Science and Technology

Scientific Objectivity

RESPONDENTS EVIDENCED CONSIDERABLE FAITH IN SCIENCE AS THE best source of reliable knowledge about the world, but most did not agree that eventually science can explain anything. Considerable skepticism was evidenced by the general public and legislator groups about scientific objectivity, with large numbers of both groups agreeing that the same scientific evidence can be interpreted to fit opposing views, and that scientific research is often affected by the values held by the researcher. Respondents from American Men and Women of Science differed strongly with both views.

Trust in Technology

A small majority of each group agreed that technology can solve most of society's problems, but 40 percent of respondents from the general public also thought that technology has become dangerous and unmanageable. Both elite groups differed strongly with that assertion. On average, the scientist and general public groups preferred that decisions about the uses of advanced technologies be made by technical experts, while the legislator group was more equivocal, with about half preferring that decisions about advanced technologies be made by the public and their representatives.

Trust in Scientists

Scientists working in colleges and universities and those working in national laboratories were more highly trusted to provide unbiased information about the risks and benefits of new technologies than were scientists working in business and industry.

Sector Roles

In a series of more specialized questions asked only of the scientist and legislator groups, scientists working in academic settings were considered to be best suited for accomplishing basic research by respondents from American Men and Women of Science, while respondents who were state legislators preferred the national laboratories for doing basic research. Both groups agreed that scientists working in business and industry were best suited for conducting applied research and development as well as application and production.

Nuclear Security Expertise

Among the scientist group, knowledge about national security, nuclear weapons technologies, and the functions of nuclear weapons laboratories was significantly related to perceptions of nuclear weapons risks and benefits. As self-rated knowledge about nuclear security increased, perceptions of the risks stemming from others' nuclear weapons increased, perceptions of risks deriving from managing US nuclear weapons decreased, and perceptions of the benefits of US nuclear weapons for achieving national interests increased. Views of domestic benefits of US nuclear weapons were not systematically related to knowledge about nuclear security.

Sector Competition

Scientist and legislator respondents agreed that post-Cold War competition for government funding is increasing in the US among scientists working in academe, government supported research facilities, and private industry, but they differed strongly about the implications of increased competition for science funding. The legislator group considered such competition to be beneficial, while the scientist group thought it was more harmful.

Investment Priorities

As to investment preferences, both groups thought that about one-third of government funding for science should be invested in applied research and development, but the scientist group thought that more of the remaining two-thirds of investments should go to basic research, while the legislator group preferred to invest more balanced proportions in application and production as well as basic research.

End Notes

[1] A declassified partial text of PDD-39 is available from the National Security Council, Washington, DC. A copy was obtained from their web site at: http://www.fas.org/irp/offdocs/pdd39.htm.

[2] Question 2-44 was converted to a one to seven scale by multiplying by .637 and adding one. The nuclear security knowledge index was then created by averaging 2-42, 2-43, and 2-44, ignoring missing values.

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Appendix 1

Questions, Distributions, and Means

Section 1: Perceptions of Post-Cold War Security (All Groups)

The nature of international security in the post-cold war era will have important implications for US strategic policies and investment strategies. This first section inquires about your perceptions of the evolving nature of post-cold war security.

1-1/Natsec Considering the international environment as a whole, and using a scale where one means the world is *much less secure,* and seven means the world is *much more secure,* how has international security changed since the end of the cold war?

%	1 (Much Less Secure)	2	3	4 (No Change)	5	6	7 (Much More Secure)	MEAN
Sci 97	1	7	11	9	37	31	4	4.8
Leg 97	2	11	17	9	33	24	5	4.5
Pub 97	8	6	15	19	34	10	9	4.3

1-2/USsec Focusing more specifically on the US, and using the same scale, how has *US* security changed since the end of the cold war?

%	1 (Much Less Secure)	2	3	4 (No Change)	5	6	7 (Much More Secure)	MEAN
Sci 97	1	5	15	12	27	32	8	4.9
Leg 97	3	10	23	9	25	23	6	4.4
Pub 97	8	8	14	19	26	15	11	4.4

1-3/USwar Turning now to nuclear considerations, on a scale where one means the chances have *decreased greatly,* and seven means the chances have *increased greatly,* how has the breakup of the Soviet Union affected the chances that the *US* will be involved in a war with *any* country in which nuclear weapons are used?

%	1 (Decreased Greatly)	2	3	4 (No Change)	5	6	7 (Increased Greatly)	MEAN
Sci 97	6	30	28	13	15	6	1	3.2
Leg 97	6	22	26	17	21	7	2	3.5
Pub 97	10	13	19	16	18	13	12	4.0
Pub 95	14	11	16	15	19	9	16	4.1
Pub 93	11	16	18	15	19	10	11	3.9
UCS 93	10	23	21	19	16	8	3	3.4
Labs 93	3	13	15	19	30	16	4	4.2

('93: USWAR-22) ('95: B19/USwar)

1-4/Nucwar Using the same scale, how do you think the breakup of the Soviet Union has affected the possibility that nuclear weapons will be used by *any* country against *any* other country?

	Decreased Greatly			No Change			Increased Greatly	
%	1	2	3	4	5	6	7	MEAN
Sci 97	2	11	21	20	28	15	3	4.2
Leg 97	3	11	20	19	28	15	4	4.2
Pub 97	7	9	15	17	21	16	14	4.4
Pub 95	8	7	12	14	22	13	23	4.7
Pub 93	6	8	14	18	22	14	18	4.5
UCS 93	3	7	13	21	27	21	8	4.6
Labs 93	1	3	7	17	31	30	12	5.1

('93: NUCWAR-23) ('95: B20/Nucwar)

The next several questions ask for your perceptions about risks to American society associated with managing *US* nuclear weapons. Using a scale where zero means *no risk,* and ten means *extreme risk,* how would you rate the risk of:

1-5/Manu Manufacturing nuclear weapons in the US?

	No Risk									Extreme Risk	
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	2	12	17	17	8	14	9	10	6	3	2	4.1
Leg 97	2	10	19	15	12	14	9	9	6	2	3	4.2
Pub 97	5	5	9	10	10	19	9	11	8	2	10	5.1
Pub 95	4	2	4	5	5	13	6	11	13	6	31	6.9
Pub 93	3	3	6	6	6	14	8	11	13	8	22	6.5
UCS 93	0	2	5	8	5	7	8	13	15	13	24	7.1
Labs 93	2	20	21	18	10	10	6	6	3	2	2	3.4

('93: MANU-5) ('95: B3/Manu)

1-6/Trans Transporting nuclear weapons in the US?

	No Risk										Extreme Risk	
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	2	13	15	16	7	13	12	10	5	3	2	4.2
Leg 97	2	9	18	13	10	11	12	12	6	2	3	4.5
Pub 97	4	5	8	11	9	17	9	12	11	4	11	5.4
Pub 95	3	2	3	4	4	12	5	10	13	9	34	7.2
Pub 93	2	2	5	5	6	13	8	13	15	7	25	6.8
UCS 93	0	3	6	9	6	11	10	12	13	12	18	6.6
Labs 93	3	21	22	17	9	8	6	7	3	1	2	3.3

('93: TRANS-6) ('95: B4/Trans)

1-7/Store Storing existing nuclear weapons in the US?

%	0 No Risk	1	2	3	4	5	6	7	8	9	10 Extreme Risk	MEAN
Sci 97	2	14	17	14	7	13	12	9	6	3	2	4.2
Leg 97	2	13	15	13	11	13	10	12	6	3	3	4.4
Pub 97	4	4	8	9	8	15	9	13	11	5	14	5.7
Pub 95	3	2	4	5	4	13	6	11	12	8	30	6.9
Pub 93	2	2	5	7	7	13	9	11	13	7	23	6.6
UCS 93	1	3	8	8	7	10	10	12	16	8	16	6.3
Labs 93	5	27	21	16	8	8	5	5	2	1	1	3.0

('93: STORE-7) ('95: B5/Store)

1-8/Dsmbl Disassembling nuclear weapons in the US?

%	0 No Risk	1	2	3	4	5	6	7	8	9	10 Extreme Risk	MEAN
Sci 97	3	16	18	17	10	13	9	8	4	2	1	3.7
Leg 97	2	13	18	14	12	13	11	8	4	2	3	4.0
Pub 97	5	6	10	10	11	19	9	10	8	3	10	5.1
Pub 95	4	3	5	7	6	14	7	9	12	6	26	6.5
Pub 93	4	3	7	8	8	17	7	10	14	6	17	6.0
UCS 93	1	5	13	14	9	12	10	9	14	5	7	5.2
Labs 93	2	17	23	20	13	9	6	5	3	1	0	3.3

('93: DSMBL-8) ('95: B6/Dsmbl)

1-9/Rwaste Storing radioactive materials in the US from disassembled weapons?

%	0 No Risk	1	2	3	4	5	6	7	8	9	10 Extreme Risk	MEAN
Sci 97	2	12	15	16	8	12	10	12	8	4	2	4.4
Leg 97	2	10	14	13	7	13	12	11	9	5	5	4.9
Pub 97	3	3	5	7	8	14	9	15	11	6	17	6.1
Pub 95	3	2	3	5	4	10	5	10	15	9	36	7.4
Pub 93	2	1	2	3	4	9	7	10	18	11	34	7.6
UCS 93	0	3	6	7	5	10	10	10	17	13	21	6.9
Labs 93	3	16	18	16	12	11	7	7	5	2	2	3.8

('93: RWASTE-9) ('95: B7/Rwaste)

1-10/Unauth Some people worry that a nuclear weapon might someday be used by US forces without the president's authorization. On a scale where zero means *not at all likely,* and ten means *highly likely,* how would you rate the likelihood of a *US* nuclear weapon being used within the next 25 years without presidential authorization?

	Not At All Likely									Highly Likely		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	16	34	20	13	4	6	3	2	2	1	0	2.1
Leg 97	17	27	21	15	5	7	3	3	2	1	1	2.3
Pub 97	17	13	14	10	5	12	4	7	7	3	9	3.9
Pub 95	15	11	8	7	5	16	5	8	8	2	15	4.7
Pub 93	15	13	11	12	6	14	4	6	8	2	10	4.1
UCS 93	7	21	17	15	5	10	6	5	6	2	4	3.6
Labs 93	20	38	19	9	3	3	1	3	2	1	1	1.9

('93: UNAUTH-20) ('95: B17/Unauth)

1-11/Explode Some people are concerned about the possibility of an accidental explosion of a nuclear weapon. On the same scale from zero to ten, how would you rate the likelihood of an accident involving a *US* nuclear weapon causing an unintended nuclear explosion?

	Not At All Likely									Highly Likely		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	11	33	21	13	6	6	4	3	2	1	0	2.4
Leg 97	9	20	22	18	7	8	6	5	3	1	1	3.0
Pub 97	7	11	13	10	8	14	8	9	8	3	9	4.6
Pub 95	6	8	8	10	8	19	6	10	9	3	13	5.2
Pub 93	5	10	12	11	8	18	8	9	7	3	10	4.8
UCS 93	4	14	17	16	6	9	8	7	7	4	6	4.2
Labs 93	24	37	18	9	3	4	2	2	1	1	0	1.7

('93: EXPLODE-21) ('95: B18/Explode)

1-12/Nsprd On a scale where zero means the likelihood for the future spread of nuclear weapons is *greatly reduced* and ten means it is *greatly increased,* how do you think the breakup of the Soviet Union has affected the likelihood that nuclear weapons will spread to other countries?

	Greatly Reduced									Greatly Increased		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	1	1	4	6	7	14	17	22	17	8	4	6.3
Leg 97	0	1	6	6	9	17	17	18	13	6	7	6.0
Pub 97	3	2	4	8	8	19	10	14	13	5	13	6.0
Pub 95	2	4	4	8	9	18	9	16	10	4	16	6.0
Pub 93	7	6	0	10	0	13	20	0	17	0	26	6.4
UCS 93	1	1	2	3	4	12	11	18	21	11	15	7.0
Labs 93	0	0	1	2	1	6	8	19	23	19	21	7.9

('93: NSPRD-37) (B22/Nsprd)

1-13/USrisk How do you think the spread of nuclear weapons to other countries influences the security of the US? On a scale where zero means the spread of nuclear weapons poses *no risk* to the US, and ten means the spread of nuclear weapons poses *extreme risk* to the US, how would you rate the risk to the US if more countries have nuclear weapons?

%	0 (No Risk)	1	2	3	4	5	6	7	8	9	10 (Extreme Risk)	Mean
Sci 97	0	1	3	6	4	8	15	23	22	11	6	6.7
Leg 97	0	0	3	4	3	8	14	21	24	11	12	7.1
Pub 97	1	1	1	3	5	10	8	15	18	11	27	7.4
Pub 95	1	1	1	2	4	10	9	15	18	8	32	7.7
Pub 93	1	0	2	3	3	9	9	16	18	8	32	7.6
UCS 93	1	1	2	3	2	5	11	18	24	15	18	7.5
Labs 93	1	0	1	1	1	5	8	17	27	20	20	7.9

('93: USRSK-38) (B23/USrisk)

1-14/Ternow Shifting now to the possibility of nuclear weapons being used by terrorists, what are your perceptions of today's threat of nuclear terrorism? On a scale where zero means there is *no threat* of nuclear weapons being used by terrorists, and ten means there is *extreme threat,* how would you rate *today's* threat of nuclear terrorism occurring anywhere in the world?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	Mean
Sci 97	0	4	7	11	8	10	14	18	17	8	4	5.8
Leg 97	0	1	5	6	6	10	16	23	17	10	6	6.5
Pub 97	2	1	3	5	6	12	10	13	17	10	22	7.0
Pub 95	1	1	2	3	5	13	9	13	17	9	27	7.3
Pub 93	1	2	3	5	6	13	10	14	18	6	22	6.9
UCS 93	1	7	9	9	4	10	14	18	14	7	6	5.7
Labs 93	0	4	9	8	5	10	15	19	17	9	5	6.0

('93: TERNOW-43) ('95: B24/Ternow)

1-15/Tenyrs On the same scale, how would you rate the threat of nuclear weapons being used by terrorists anywhere in the world during the *next ten years?*

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	Mean
Sci 97	0	3	5	9	8	11	14	16	18	10	6	6.2
Leg 97	0	2	4	6	6	8	16	19	18	11	10	6.6
Pub 97	2	1	4	4	7	13	10	15	16	8	21	6.8
Pub 95	1	1	3	4	5	12	9	15	14	7	28	7.2
Pub 93	0	1	3	5	5	15	9	16	17	6	23	7.0
UCS 93	1	2	5	7	5	7	11	16	17	16	14	6.8
Labs 93	0	1	3	5	3	6	8	18	21	19	15	7.3

('93: TENYRS-44) ('95: B25/Tenyrs)

1-16/Influ Next we turn to broad issues of US leadership. The next several questions use a scale where zero means *not at all important*, and ten means *extremely important*. First, how important are US nuclear weapons for US influence over international events?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	2	5	8	10	6	12	13	13	14	12	6	5.8
Leg 97	1	2	4	6	7	10	13	17	17	12	11	6.6
Pub 97	4	1	5	5	8	15	11	14	14	6	17	6.3
Pub 95	3	2	5	7	6	18	10	14	13	4	18	6.2
Pub 93	4	3	5	7	7	18	10	15	12	5	16	6.1
UCS 93	9	11	13	11	5	10	10	12	9	5	5	4.5
Labs 93	1	4	8	7	4	7	11	18	19	11	10	6.4

('93: INFLU-49) ('95: B26/Influ)

1-17/Status How important are US nuclear weapons for maintaining US status as a world leader?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	3	5	10	10	6	11	11	12	15	12	7	5.7
Leg 97	1	2	5	6	6	9	11	16	17	15	12	6.7
Pub 97	4	2	4	5	7	12	9	13	15	7	22	6.6
Pub 95	4	3	4	5	5	15	8	14	14	6	24	6.7
Pub 93	3	4	5	6	7	15	8	16	11	6	19	6.3
UCS 93	13	12	12	11	7	10	9	10	7	3	4	4.1
Labs 93	2	4	6	8	4	9	11	17	16	12	11	6.3

('93: STATUS-50) ('95: B27/Status)

1-18/Sprpwr How important is it for the US to remain a military superpower?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	1	1	3	4	4	7	9	14	17	21	19	7.4
Leg 97	0	1	1	2	4	3	6	9	14	18	41	8.3
Pub 97	1	1	2	2	3	6	6	9	14	11	46	8.2
Pub 95	2	2	1	3	2	9	6	12	13	7	44	7.9
Pub 93	1	2	2	3	3	8	7	15	10	8	39	7.6
UCS 93	10	6	8	9	5	8	12	14	11	7	11	5.3
Labs 93	1	1	2	3	2	5	6	13	18	18	31	7.9

('93: SPRPWR-51) ('95: B28/Sprpwr

1-19/Amway How important have nuclear weapons been to preserving America's way of life?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	4	4	9	7	6	11	9	14	14	12	10	5.9
Leg 97	2	2	4	6	6	10	11	13	16	16	14	6.7
Pub 97	6	2	5	6	7	14	9	13	15	6	18	6.3
Pub 95	5	3	4	6	7	15	9	12	14	5	20	6.3
Pub 93	4	4	5	7	7	15	9	13	15	6	15	6.1
UCS 93	15	10	11	8	5	11	9	12	9	5	5	4.3
Labs 93	2	2	3	4	2	5	7	14	19	20	22	7.5

('93: AMWAY-70) ('95: B36/Amway)

1-20/Pdeter The next three questions ask about your perceptions of nuclear deterrence. First, using the same scale where zero is *not at all important,* and ten is *extremely important,* how important was nuclear deterrence in preventing nuclear conflict during the cold war?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	1	1	2	2	2	5	8	16	20	24	19	7.7
Leg 97	0	1	1	3	3	6	6	12	18	26	23	7.9
Pub 97	2	1	1	2	4	10	9	11	19	10	31	7.6
Pub 95	1	1	1	2	3	10	7	13	16	9	36	7.8

('95: B33/Pdeter)

1-21/Ndeter How important are our nuclear weapons for preventing other countries from using nuclear weapons against us today?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	1	2	3	6	4	8	8	15	18	20	16	7.1
Leg 97	0	1	2	3	4	6	8	13	19	22	21	7.6
Pub 97	2	1	2	3	4	11	9	11	18	11	29	7.4
Pub 95	2	1	2	3	3	10	8	13	16	8	34	7.6

('95: B34/Ndeter)

1-22/Fdeter For this question, zero means *not at all effective,* and ten means *extremely effective.* If more countries acquire nuclear weapons in the future, how effective will nuclear deterrence be in preventing nuclear wars from occurring anywhere in the world?

%	0 (Not At All Effective)	1	2	3	4	5	6	7	8	9	10 (Extremely Effective)	MEAN
Sci 97	2	5	9	11	8	11	9	17	13	10	5	5.6
Leg 97	2	5	7	10	9	11	9	11	15	12	10	5.9
Pub 97	7	2	5	8	7	15	7	11	14	5	18	6.0
Pub 95	7	4	4	7	6	16	8	13	12	4	20	6.0

('95: B35/Fdeter)

1-23/Reduce Under the terms of arms reductions agreements, the US and Russia are reducing their stockpiles of nuclear weapons. Recent published reports estimate that the US and Russia each have about 7,000 strategic warheads deployed today. If mutual reductions in the number of US and Russian nuclear weapons are verifiable, to approximately what level would you be willing to reduce the number of US nuclear weapons?

%	7,000 – 6,501	6,500 – 6,001	6,000 – 5,501	5,500 – 5,001	5,000 – 4,501	4,500 – 4,001	4,000 – 3,501	3,500 – 3,001
Sci 97	3	0	1	1	4	1	3	7
Leg 97	10	2	2	3	9	1	6	13
Pub 97	11	1	2	0	11	1	6	7

%	3,000 – 2,501	2,500 – 2,001	2,000 – 1,501	1,500 – 1,001	1,000 – 501	500–1	–0–	MEDIAN
Sci 97	6	6	7	11	21	21	7	1,500 – 1,001
Leg 97	10	5	6	8	10	11	6	3,000 – 2,501
Pub 97	7	2	7	1	8	17	21	2,000 – 1,501

If China does not enter into arms control agreements to reduce the number of its nuclear weapons, how would that influence your views about US reductions? Please respond to the following two statements about China using a scale where one means *strongly disagree,* and seven means *strongly agree.*

1-24/PRC1 The number of China's nuclear weapons should not influence the number of US nuclear weapons.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	34	28	14	8	7	6	4	2.6
Leg 97	48	22	10	7	4	5	5	2.3
Pub 97	38	8	6	6	10	7	24	3.6

1-25/PRC2 The US should not reduce below the number of nuclear weapons that China maintains.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	4	6	9	13	11	20	37	5.3
Leg 97	3	5	7	10	9	18	49	5.7
Pub 97	15	5	5	7	10	8	50	5.2

The next several questions address arms control more broadly.

1-26/CTBT On a scale where one means *strongly oppose,* and seven means *strongly support,* how do you feel about the US participating in a treaty that bans all nuclear test explosions?

	Strongly Oppose					Strongly Support		
%	1	2	3	4	5	6	7	MEAN
Sci 97	3	4	4	7	11	28	42	5.7
Leg 97	7	7	7	15	15	23	25	4.9
Pub 97	12	4	5	7	10	11	52	5.4
Pub 95	6	5	3	15	13	11	46	5.4

('95: B37/CTBT used 0–10 scale; converted to 1–7 scale above)

1-27/FMC On the same scale, how do you feel about the US participating in a treaty that bans production of nuclear materials that could be used to make nuclear weapons?

	Strongly Oppose					Strongly Support		
%	1	2	3	4	5	6	7	MEAN
Sci 97	6	8	6	10	15	25	31	5.2
Leg 97	9	11	9	14	15	22	19	4.6
Pub 97	12	4	7	8	11	11	46	5.2
Pub 95	6	6	4	16	16	10	43	5.3

('95: B38/FMC used 0–10 scale; converted to 1–7 scale above)

1-28/Disarm How do you feel about the US agreeing to a provision that requires us to eventually eliminate all of our nuclear weapons?

	Strongly Oppose					Strongly Support		
%	1	2	3	4	5	6	7	MEAN
Sci 97	17	15	10	11	12	14	21	4.1
Leg 97	28	17	12	10	11	9	13	3.4
Pub 97	23	8	9	7	10	8	35	4.4
Pub 95	12	12	7	18	12	7	32	4.6

('95: B39/Disarm used 0–10 scale; converted to 1–7 scale above)

Using a scale where one means you *strongly disagree,* and seven means you *strongly agree,* please respond to the following two statements.

1-29/Nonucs It is feasible to eliminate all nuclear weapons worldwide within the next 25 years.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	24	25	12	8	12	10	8	3.2
Leg 97	30	21	13	12	10	8	6	3.0
Pub 97	31	11	9	6	11	6	26	3.8
Pub 95	26	9	10	9	13	8	24	4.0
Pub 93	29	14	8	6	11	7	25	3.8
UCS 93	16	20	11	10	12	16	15	3.9
Labs 93	49	25	9	5	6	4	3	2.2

('93: NONUCS-41) ('95: C3/Nonucs)

1-30/Future Even if all the nuclear weapons could somehow be eliminated worldwide, it would be extremely difficult to keep other countries from building them again.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	1	4	3	6	17	35	35	5.8
Leg 97	1	3	4	5	14	30	44	5.9
Pub 97	8	4	2	4	11	14	58	5.8
Pub 95	5	2	3	6	14	17	52	5.8
Pub 93	5	3	3	4	12	16	56	5.9
UCS 93	3	7	6	7	20	32	25	5.3
Labs 93	1	1	1	2	10	35	50	6.2

('93: FUTURE-42) ('95: C4/Future)

1-31/Retain On a scale where zero is *not at all important,* and ten is *extremely important,* how important is it for the US to retain nuclear weapons today?

%	0 (Not At All Important)	1	2	3	4	5	6	7	8	9	10 (Extremely Important)	MEAN
Sci 97	1	2	4	3	3	6	8	15	19	20	20	7.4
Leg 97	1	1	3	3	3	4	6	14	19	16	30	7.8
Pub 97	3	1	2	3	4	14	7	18	13	5	30	7.2
Pub *95	7	0	6	10	0	11	0	18	12	0	36	6.8
Pub *93	6	0	6	11	0	14	0	20	13	0	30	6.6
UCS *93	15	17	0	16	0	15	16	0	12	0	8	4.5
Labs *93	1	4	0	6	0	8	12	0	29	0	41	7.9

('93: RETAIN-24) ('95: B21/Retain) *In 1993 and 1995, answers to this question were provided on a 1–7 scale. Results were converted to 0–10 scale for above comparisons.

1-32/Tanks Using a scale where one means you *strongly disagree,* and seven means you *strongly agree,* please respond to the following statement. "Having a nuclear arsenal means the US can spend less for national defense than would be necessary without nuclear weapons."

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	15	25	13	15	14	10	8	3.5
Leg 97	12	21	12	17	16	15	8	3.8
Pub 97	20	9	10	11	18	10	22	4.1
Pub 95	25	11	11	13	15	9	15	3.7
Pub 93	24	15	15	12	17	9	9	3.4
UCS 93	38	30	10	9	7	3	3	2.4
Labs 93	23	31	14	8	13	9	4	3.0

('93: TANKS-58) ('95: B30/Tanks)

The next two questions deal with the economic value of defense industry jobs and defense related technologies. Both use a scale where one means *little economic value,* and seven means *great economic value.*

1-33/Jobs First, how do you rate the economic value of defense industry jobs in America?

%	1 (Little Economic Value)	2	3	4	5	6	7 (Great Economic Value)	MEAN
Sci 97	4	9	8	16	32	25	7	4.7
Leg 97	1	4	6	15	31	28	15	5.1
Pub 97	4	3	8	14	28	18	25	5.1
Pub 95	7	6	10	17	23	14	23	4.8
Pub 93	7	9	13	15	23	15	18	4.6
UCS 93	26	29	17	10	9	6	2	2.7
Labs 93	4	8	12	14	27	27	9	4.7

('93: JOBS-59) ('95: B31/Jobs)

1-34/Tectran Next, how do you rate the economic value of technological advances in defense industries for other areas of the US economy?

%	1 (Little Economic Value)	2	3	4	5	6	7 (Great Economic Value)	MEAN
Sci 97	1	7	7	12	26	31	16	5.1
Leg 97	0	2	4	8	21	40	26	5.7
Pub 97	2	2	4	9	24	23	35	5.6
Pub 95	4	3	8	13	24	19	30	5.3
Pub 93	NA	NA	NA	NA	NA	NA	NA	NA
UCS 93	5	18	17	17	24	15	4	4.0
Labs 93	1	5	5	9	26	38	17	5.4

('93: TECTRAN-91, UCS and Labs only) ('95: B32/Tectran)

Next we want your views about spending priorities. Please indicate how you think government spending on nuclear weapons issues should change in each of the following areas using a scale where one means spending should *substantially decrease,* and seven means spending should *substantially increase.*

1-35/Devtest Developing and testing new nuclear weapons?

	SUBSTANTIALLY DECREASE					SUBSTANTIALLY INCREASE		
%	1	2	3	4	5	6	7	MEAN
Sci 97	22	33	18	19	5	2	0	2.6
Leg 97	10	21	21	31	13	2	1	3.3
Pub 97	25	16	20	15	13	3	7	3.1
Pub 95	44	14	14	10	9	2	7	2.6
Pub 93	40	16	12	9	11	3	8	2.8
UCS 93	74	17	5	3	1	0	0	1.4
Labs 93	16	25	23	23	9	3	1	3.0

('93: DEV/TEST-13) (B10/Devtest)

1-36/Mtain Maintaining existing nuclear weapons in reliable condition?

	SUBSTANTIALLY DECREASE					SUBSTANTIALLY INCREASE		
%	1	2	3	4	5	6	7	MEAN
Sci 97	4	9	13	37	21	13	3	4.1
Leg 97	3	5	10	32	28	15	5	4.4
Pub 97	10	6	12	15	20	15	22	4.6
Pub 95	17	6	12	14	17	11	24	4.4
Pub* 93	12	6	13	15	19	10	25	4.5
UCS*93	28	26	21	18	5	1	1	2.6
Labs*93	3	6	13	40	24 9	3 11	3	4.2

('93: MTAIN-14) ('95: B11/Mtain)
* Wording in 1993: "Maintenance of existing nuclear weapons?"

1-37/Safwpn Research to increase the safety of existing nuclear weapons?

	SUBSTANTIALLY DECREASE					SUBSTANTIALLY INCREASE		
%	1	2	3	4	5	6	7	MEAN
Sci 97	2	5	7	21	29	24	12	4.9
Leg 97	1	2	5	18	30	27	17	5.2
Pub 97	5	2	5	9	14	17	47	5.6
Pub 95	11	4	7	7	14	12	45	5.2
Pub 93	8	3	8	10	17	14	40	5.2
UCS 93	14	12	14	23	16	12	10	3.9
Labs 93	2	4	9	22	31	22	9	4.8

('93: SAFWPN-15) (B12/Safwpn)

1-38/Tng Training to assure competence of those who manage US nuclear weapons?

%	1 (Substantially Decrease)	2	3	4	5	6	7 (Substantially Increase)	MEAN
Sci 97	1	1	4	22	26	27	19	5.3
Leg 97	1	0	5	17	29	26	22	5.4
Pub 97	3	1	2	7	11	14	60	6.0
Pub 95	8	2	3	6	10	10	61	5.8
Pub 93	6	2	4	8	14	13	52	5.7
UCS 93	3	3	7	27	20	19	21	5.0
Labs 93	0	1	3	30	31	24	11	5.1

('93: TNG-16) ('95: B13/Tng)

1-39/Sustain Maintaining the ability to develop and improve US nuclear weapons in the future?

%	1 (Substantially Decrease)	2	3	4	5	6	7 (Substantially Increase)	MEAN
Sci 97	6	13	12	27	24	14	5	4.1
Leg 97	4	8	10	21	30	18	9	4.5
Pub 97	13	9	12	13	19	10	24	4.4
Pub 95	23	8	11	12	16	8	22	4.0
Pub 93	23	12	16	12	14	8	16	3.7
UCS 93	41	23	14	14	6	1	1	2.3
Labs 93	5	7	11	28	25	17	7	4.4

('93: SUSTAIN-17) ('95: B14/Sustain)

1-40/Prolif Preventing the spread of nuclear weapons?

%	1 (Substantially Decrease)	2	3	4	5	6	7 (Substantially Increase)	MEAN
Sci 97	1	1	2	10	22	32	33	5.8
Leg 97	1	2	3	13	21	30	31	5.6
Pub 97	9	2	3	6	10	13	57	5.7
Pub 95	18	3	3	5	9	10	52	5.2
Pub 93	14	4	5	6	12	12	46	5.2
UCS 93	1	0	1	4	6	22	65	6.4
Labs 93	0	1	1	8	19	36	36	5.9

('93: PROLIF-18) ('95: B15/Prolif)

1-41/Terror Preventing nuclear terrorism?

%	1	2	3	4	5	6	7	MEAN
	SUBSTANTIALLY DECREASE					SUBSTANTIALLY INCREASE		
Sci 97	1	1	1	6	14	30	48	6.1
Leg 97	0	1	1	5	12	27	54	6.2
Pub 97	7	1	1	3	6	9	73	6.2
Pub 95	13	2	1	2	5	7	69	5.8
Pub 93	7	2	4	5	8	12	61	5.8
UCS 93	1	1	1	7	11	22	57	6.2
Labs 93	0	0	1	6	17	31	45	6.1

('93: TERROR-19) ('95: B16/Terror)

On a scale where zero means *no trust,* and ten means *complete trust,* how much do you trust the following organizations to safely manage nuclear resources such as nuclear weapons or radioactive materials?

1-42/DOD The Department of Defense?

%	0	1	2	3	4	5	6	7	8	9	10	MEAN
	NO TRUST									COMPLETE TRUST		
Sci 97	2	4	5	6	6	13	11	16	22	11	3	6.1
Leg 97	1	3	4	3	5	11	11	23	23	11	5	6.5
Pub 97	6	4	5	8	6	18	12	18	10	5	7	5.5
Pub 95	5	6	6	10	8	21	11	14	9	2	7	5.2

('95: C35/DOD)

1-43/Util Public utility companies?

%	0	1	2	3	4	5	6	7	8	9	10	MEAN
	NO TRUST									COMPLETE TRUST		
Sci 97	5	5	12	12	10	14	12	14	11	5	1	4.8
Leg 97	5	5	7	8	9	15	16	15	14	6	1	5.2
Pub 97	10	8	9	13	11	20	10	10	5	1	4	4.2
Pub 95	8	11	8	14	13	18	8	10	6	1	4	4.2

('95: C36/Util)

1-44/DoE The Department of Energy?

%	0	1	2	3	4	5	6	7	8	9	10	MEAN
	NO TRUST									COMPLETE TRUST		
Sci 97	3	3	6	9	7	16	13	18	17	7	1	5.6
Leg 97	3	4	7	7	11	17	12	18	13	5	1	5.3
Pub 97	6	4	6	9	9	22	12	15	8	3	5	5.1
Pub 95	5	6	7	11	11	22	11	12	8	2	5	4.9

('95: C37/DoE)

1-45/Labs National laboratories?

%	0 (No Trust)	1	2	3	4	5	6	7	8	9	10 (Complete Trust)	MEAN
Sci 97	1	2	4	5	6	11	12	18	22	16	3	6.5
Leg 97	2	2	5	7	7	17	12	17	20	8	2	5.9
Pub 97	6	4	5	9	10	24	14	13	9	3	4	5.1
Pub 95	5	5	5	10	11	23	13	14	8	2	5	5.1

('95: C38/Labs)

To close this first section on perceptions about strategic issues, we want your overall assessment of current and future threats to the US from two sources.

1-46/Rusnow First, on a scale where zero means *no threat,* and ten means *extreme threat,* how would you rate the *current* threat to the US posed by Russia's nuclear weapons?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	2	8	21	18	9	14	11	10	5	1	0	4.0
Leg 97	1	5	12	18	13	16	15	11	6	2	1	4.6
Pub 97	5	4	11	14	12	19	9	9	8	2	7	4.8

1-47/PRCnow Next, using the same scale, how would you rate the *current* threat to the US from China's nuclear weapons?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	2	8	15	15	11	13	13	11	8	3	1	4.5
Leg 97	1	2	8	12	9	15	17	15	11	5	5	5.5
Pub 97	3	2	5	8	8	19	13	16	11	5	10	5.8

1-48/Rus+10 Turning now to your outlook for the future, on the same scale, how would you rate the threat to the US in the *next ten years* from Russia's nuclear weapons?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	3	12	20	17	12	14	9	8	4	1	0	3.8
Leg 97	1	7	14	16	11	17	14	11	5	2	1	4.4
Pub 97	6	5	11	15	11	21	8	8	6	3	7	4.7

1-49/PRC+10 And finally, on the same scale, how would you rate the threat to the US in the *next ten years* from China's nuclear weapons?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	1	5	9	13	11	15	13	14	12	5	2	5.2
Leg 97	0	2	6	10	9	11	14	18	14	10	6	6.0
Pub 97	3	3	5	8	8	17	13	14	12	6	11	5.8

Section 2: Science and Policy

The next several questions ask about categories of research, development, and application. Because these categories sometimes overlap and are not always easy to distinguish, please use the definitions provided with each of the following sets of questions.

Basic research is conducted to gain more comprehensive knowledge of the subject under study, with greater priority given to advancing conceptual understanding than to specific applications of that knowledge.

Using a scale where one means *very poorly suited,* and seven means *very well suited,* please rate each of the following groups as to their suitability for accomplishing ***basic research.***

2-1/Ubasic Scientists working in colleges and universities?

%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci 97	0	1	2	3	9	34	50	6.2
Leg 97	1	4	4	11	25	33	21	5.4

2-2/Bbasic Scientists working in business and industry?

%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci 97	1	9	16	19	28	20	6	4.5
Leg 97	1	3	4	13	23	40	16	5.4

2-3/Lbasic Scientists working in federally funded major research facilities? (such as Los Alamos National Laboratory, National Institute for Science and Technology, Naval Research Laboratory, Oak Ridge National Laboratory, etc.)

		Very Poorly Suited					Very Well Suited	
	%	1	2	3	4	5	6	7	MEAN
Sci	97	1	1	3	9	21	39	26	5.7
Leg	97	0	1	3	10	19	39	28	5.7

Applied research and development is aimed at gaining specific knowledge about the means by which a recognized need may be met, and the systematic use of that knowledge for developing useful materials, devices, systems, or methods, including designing and developing prototypes and processes.

Using the same scale, please rate each of these groups of scientists as to their suitability for accomplishing *applied research and development.*

2-4/UR&D Scientists working in colleges and universities?

	%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci	97	3	12	14	21	25	18	7	4.3
Leg	97	2	5	11	22	31	21	9	4.7

2-5/BR&D Scientists working in business and industry?

	%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci	97	0	1	1	5	16	43	34	6.0
Leg	97	0	1	2	9	21	40	27	5.8

2-6/LR&D Scientists working in federally funded major research facilities?

	%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci	97	1	4	7	16	26	33	13	5.1
Leg	97	0	1	4	14	27	33	20	5.5

Application and production is the translation of knowledge from applied research and development into production processes and products.

Again, using the same scale, please rate each of these groups as to their suitability for accomplishing ***application and production.***

2-7/UA&P Scientists working in colleges and universities?

		VERY POORLY SUITED					VERY WELL SUITED	
	%	1	2	3	4	5	6	7	MEAN
Sci	97	19	28	19	16	12	5	1	3.0
Leg	97	5	13	15	24	27	12	4	4.0

2-8/BA&P Scientists working in business and industry?

		VERY POORLY SUITED					VERY WELL SUITED		
	%	1	2	3	4	5	6	7	MEAN
Sci	97	0	1	2	4	12	37	44	6.2
Leg	97	0	0	3	7	13	40	38	6.0

2-9/LA&P Scientists working in federally funded major research facilities?

		VERY POORLY SUITED					VERY WELL SUITED		
	%	1	2	3	4	5	6	7	MEAN
Sci	97	4	11	13	21	26	19	5	4.3
Leg	97	0	3	7	16	33	27	13	5.1

Finally, please rate each of these same groups as to their suitability for conducting *interdisciplinary* research requiring integrated expertise from multiple scientific fields.

2-10/Uinter Scientists working in colleges and universities?

		VERY POORLY SUITED					VERY WELL SUITED		
	%	1	2	3	4	5	6	7	MEAN
Sci	97	3	8	8	10	21	27	22	5.1
Leg	97	2	5	7	15	26	29	17	5.1

2-11/Binter Scientists working in business and industry?

%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci 97	1	6	10	18	27	27	11	4.9
Leg 97	1	2	8	16	28	33	12	5.2

2-12/Linter Scientists working in federally funded major research facilities?

%	1 (Very Poorly Suited)	2	3	4	5	6	7 (Very Well Suited)	MEAN
Sci 97	2	4	6	15	28	32	14	5.1
Leg 97	1	2	5	14	34	28	17	5.3

How do you think federal investments should be apportioned between the following functions? Please indicate a percentage for each such that the three categories total 100 percent of federal investments for these functions.

	Science Area	Mean Values Scientists 97	Mean Values Legislators 97
2-13a/basic	Basic research	49	39
2-13b/R&D	Applied research and development	32	34
2-13c/A&P	Application and production	19	27

Using a scale where one means *strongly disagree,* and seven means *strongly agree,* please respond to the following assertions about science.

2-14/Explain In principle, science can eventually explain anything.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	17	14	7	7	18	26	10	4.1
Leg 97	13	14	10	16	20	22	4	4.0
Pub 97	20	9	9	10	19	15	19	4.2

2-15/Viewpts The same scientific evidence can almost always be interpreted to fit opposing points of view.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	15	34	17	12	12	8	2	3.0
Leg 97	4	13	15	22	22	19	6	4.3
Pub 97	8	7	10	12	21	18	26	4.9

2-16/Results The *results* of scientific research will almost always be significantly affected by the values held by the researcher.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	11	25	13	15	21	12	3	3.5
Leg 97	2	10	11	21	30	18	8	4.5
Pub 97	4	5	8	11	23	18	31	5.2

2-17/Rely Science is the *best* source of reliable knowledge about the world.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	1	4	4	8	15	31	37	5.8
Leg 97	2	5	7	17	31	26	11	4.9
Pub 97	9	6	9	12	20	17	27	4.9

2-18/Tech+ Technology can solve most of society's problems.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	14	23	17	20	17	5	2	3.3
Leg 97	13	21	18	22	16	7	2	3.3
Pub 97	22	14	16	15	18	6	8	3.4

2-19/Tech– Technology has become dangerous and unmanageable.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	28	36	13	10	8	3	2	2.5
Leg 97	13	32	21	18	10	4	1	3.0
Pub 97	16	16	15	13	17	10	13	3.8

2-20/Advtech Some people think that decisions about the applications of advanced technologies, such as genetic engineering or nuclear energy, should be made primarily by the public. Others think that these decisions should be made primarily by technically trained experts. On a scale where one means that such decisions should be made mostly by the *public,* and seven means that such decisions should be made mostly by *experts,* what is your opinion?

%	1 (Mostly by the Public)	2	3	4	5	6	7 (Mostly by Experts)	MEAN
Sci 97	2	6	6	22	27	28	9	4.9
Leg 97	7	15	15	27	20	14	3	3.9
Pub 97	10	7	11	20	19	11	23	4.6
Pub 95	11	4	8	15	18	14	30	4.9
Pub 93	8	3	8	19	25	15	22	4.8
UCS 93	12	11	11	28	16	15	7	4.0
Labs 93	2	5	4	22	25	31	10	5.0

('93: ADVTECH-60) ('95: C-33/Advtech)

Using a scale where zero means *no trust,* and ten means *complete trust,* how much trust would you place in each of the following communities of scientists to provide unbiased information abut the risks and benefits of new technologies?

2-21/Utrust Scientists working in colleges and universities?

%	0 (No Trust)	1	2	3	4	5	6	7	8	9	10 (Complete Trust)	MEAN
Sci 97	0	1	2	4	3	7	9	21	33	17	3	7.1
Leg 97	1	3	5	7	9	14	14	23	16	7	2	5.9
Pub 97	1	2	2	5	8	21	15	20	16	3	7	6.1

2-22/Btrust Scientists working in business and industry?

%	0 (No Trust)	1	2	3	4	5	6	7	8	9	10 (Complete Trust)	MEAN
Sci 97	2	4	12	14	14	16	17	13	7	1	0	4.7
Leg 97	1	3	9	11	13	21	14	16	9	3	1	5.1
Pub 97	3	4	6	9	14	24	14	15	6	1	3	5.0

2-23/Ltrust Scientists working in national laboratories?

%	0 (No Trust)	1	2	3	4	5	6	7	8	9	10 (Complete Trust)	MEAN
Sci 97	1	1	3	4	6	14	14	23	22	11	2	6.5
Leg 97	1	0	4	6	8	16	18	21	16	8	1	6.1
Pub 97	2	3	4	7	10	21	15	18	10	4	6	5.7

2-24/Rescpt How is competition for federal research funding changing among scientists working in academe vs. those working in government vs. those working in industry? On a scale where one means competition for research resources is *substantially declining,* and seven means competition is *substantially increasing,* please indicate your view of competition for federal research funding among these sectors of science.

	Substantially Declining					Substantially Increasing	
%	1	2	3	4	5	6	7	MEAN
Sci 97	1	3	5	8	18	40	24	5.6
Leg 97	1	3	8	21	24	32	11	5.0

2-25/Valucpt On a scale where one is *extremely harmful,* and seven is *extremely beneficial,* how do you think *increased* competition among these three sectors for federal research dollars would affect US national interests?

	Extremely Harmful					Extremely Beneficial		
%	1	2	3	4	5	6	7	MEAN
Sci 97	5	17	22	21	22	10	2	3.8
Leg 97	1	5	12	26	30	20	5	4.6

Our next series of questions deals with critical infrastructures in the US such as telecommunications, electrical power systems, gas and oil supplies and services, banking and finance, transportation systems, water supply systems, emergency services, and continuity of government.

First we want to know your perceptions about potential threats to these kinds of infrastructures as a group. On a scale where zero means *no threat,* and ten means *extreme threat,* please rate each of the following as potential threats to critical US infrastructures.

2-26/Cifor Significant damage to critical infrastructures resulting from terrorism sponsored by foreign groups or individuals?

	No Threat									Extreme Threat		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	0	4	12	11	7	9	14	19	14	7	3	5.6
Leg 97	0	2	8	8	6	10	18	25	14	7	3	6.0
Pub 97	2	3	4	8	8	15	12	16	15	4	11	6.1

2-27/CIUS Significant damage to critical infrastructures resulting from terrorism sponsored by US groups or individuals?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	1	7	13	14	10	11	16	12	9	4	2	4.9
Leg 97	1	6	11	13	11	15	16	15	8	3	2	4.9
Pub 97	2	4	8	14	14	20	11	12	7	2	6	5.0

2-28/Cidstr Significant damage to critical infrastructures resulting from natural disasters?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	0	5	13	14	11	17	14	15	6	4	1	4.8
Leg 97	0	2	8	9	13	20	17	16	11	2	3	5.4
Pub 97	1	2	5	9	11	24	13	15	10	3	7	5.6

Turning now to individual types of infrastructures, some people have suggested that terrorists might pose physical threats to property and people and electronic threats to computer networks and other technologies. On a scale where zero means *no threat,* and ten means *extreme threat,* please rate the threat that you think terrorists pose to each of the following categories of essential services. Please consider both the *likelihood* of such terrorist acts occurring and their potential *consequences.*

2-29/Tele Telecommunications (such as telephones, television, radio, the internet, etc.)?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	0	6	14	14	7	10	13	17	11	5	3	5.1
Leg 97	0	3	9	11	10	14	17	16	10	6	3	5.5
Pub 97	2	4	5	7	8	14	12	13	14	7	14	6.1

2-30/Elec Electrical power systems (including generating, transmitting, and distributing electrical power)?

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	1	5	12	11	9	11	15	14	14	5	2	5.2
Leg 97	0	3	8	10	10	12	18	19	12	5	3	5.6
Pub 97	3	3	5	9	9	16	12	15	11	5	11	5.8

2-31/Oil Gas and oil supplies and services (including producing, refining, transporting, and distributing petroleum products and natural gas)?

%	NO THREAT 0	1	2	3	4	5	6	7	8	9	EXTREME THREAT 10	MEAN
Sci 97	1	7	13	13	9	15	12	12	12	4	2	5.0
Leg 97	0	3	7	10	10	15	18	16	11	6	3	5.6
Pub 97	2	2	4	8	8	14	13	15	14	6	12	6.1

2-32/Bank Banking and finance (including checking services, credit cards, stock markets, etc.)?

%	NO THREAT 0	1	2	3	4	5	6	7	8	9	EXTREME THREAT 10	MEAN
Sci 97	2	10	16	14	11	13	11	10	7	3	1	4.3
Leg 97	1	7	10	14	11	18	15	11	7	4	2	4.8
Pub 97	3	4	8	10	9	15	11	13	11	5	11	5.6

2-33/Tran Transportation systems (capabilities for all forms of travel, freight shipments, etc.)?

%	NO THREAT 0	1	2	3	4	5	6	7	8	9	EXTREME THREAT 10	MEAN
Sci 97	1	7	13	14	9	13	13	15	8	4	2	4.9
Leg 97	1	3	9	11	9	16	15	16	10	6	3	5.4
Pub 97	2	4	7	8	9	16	14	13	10	5	12	5.7

2-34/H20 Water supply systems (including watersheds, aquifers, water treatment, and water distribution for all purposes)?

%	NO THREAT 0	1	2	3	4	5	6	7	8	9	EXTREME THREAT 10	MEAN
Sci 97	0	5	11	14	8	12	13	15	12	6	3	5.3
Leg 97	0	2	8	9	8	15	19	15	11	8	5	5.8
Pub 97	3	3	6	10	10	15	10	13	12	6	12	5.8

2-35/Emer Emergency services (such as medical, police, fire, and rescue)?

%	NO THREAT 0	1	2	3	4	5	6	7	8	9	EXTREME THREAT 10	MEAN
Sci 97	3	12	20	18	9	13	11	7	4	2	1	3.8
Leg 97	2	6	15	16	14	17	13	7	6	2	2	4.4
Pub 97	5	7	11	14	12	16	9	8	7	3	9	4.8

2-36/Govt Continuity of government (preserving institutions and functions of government)?

		NO THREAT									EXTREME THREAT	
	%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci	97	7	19	21	16	8	13	7	4	3	2	1	3.2
Leg	97	4	12	16	14	12	14	11	7	6	2	1	4.0
Pub	97	4	6	9	10	11	17	10	12	8	2	9	5.1

Now we want you to consider who should be responsible for protecting these kinds of essential services in the US if terrorists *do* pose a threat. Please consider four parties that might have some level of responsibility: the federal government, state governments, local governments, and private industry. Please approximate what percent of the total responsibility, if any, should be assumed by each of these four parties for protecting each of the following three sectors?

(Odd #s) **2-37/Elec** From among these four parties, what percent of overall responsibility for protecting *electrical power systems* from terrorism should be assigned to:

			Mean Values	
	Science Area	Scientists 97	Legislators 97	Public 97
2-37a/Pvt	Private industry	37	32	26
2-37b/Local	Local governments	11	12	17
2-37c/State	State governments	16	20	20
2-37d/Fed	Federal government	36	37	32
2-37e/Oth	Unassigned/Other	NA	NA	5

(Odd #s) **2-38/Tele** From among these four parties, what percent of overall responsibility for protecting *telecommunications* from terrorism should be assigned to:

			Mean Values	
	Science Area	Scientists 97	Legislators 97	Public 97
2-38a/Pvt	Private industry	39	36	27
2-38b/Local	Local governments	8	9	15
2-38c/State	State governments	13	17	18
2-38d/Fed	Federal government	40	38	35
2-38e/Oth	Unassigned/Other	NA	NA	5

(Odd #s) **2-39/Gas** From among these four parties, what percent of overall responsibility for protecting *gas and oil supplies and services* from terrorism should be assigned to:

	Science Area	Scientists 97	Mean Values Legislators 97	Public 97
2-39a/Pvt	Private industry	40	35	25
2-39b/Local	Local governments	8	9	15
2-39c/State	State governments	13	16	19
2-39d/Fed	Federal government	39	41	36
2-39e/Oth	Unassigned/Other	NA	NA	5

(Even #s) **2-37/Bank** From among these four parties, what percent of overall responsibility for protecting *banking and finance* from terrorism should be assigned to:

	Science Area	Scientists 97	Mean Values Legislators 97	Public 97
2-37a/Pvt	Private industry	38	39	26
2-37b/Local	Local governments	9	8	15
2-37c/State	State governments	13	16	19
2-37d/Fed	Federal government	40	38	36
2-37e/Oth	Unassigned/Other	NA	NA	5

(Even #s) **2-38/H20** From among these four parties, what percent of overall responsibility for protecting *water supply systems* from terrorism should be assigned to:

	Science Area	Scientists 97	Mean Values Legislators 97	Public 97
2-38a/Pvt	Private industry	14	17	17
2-38b/Local	Local governments	29	28	24
2-38c/State	State governments	27	26	25
2-38d/Fed	Federal government	31	29	31
2-38e/Oth	Unassigned/Other	NA	NA	4

(Even #s) **2-39/Trans** From among these four parties, what percent of overall responsibility for protecting *transportation systems* from terrorism should be assigned to:

	Science Area	Scientists 97	Mean Values Legislators 97	Public 97
2-39a/Pvt	Private industry	23	17	17
2-39b/Local	Local governments	12	14	19
2-39c/State	State governments	22	28	24
2-39d/Fed	Federal government	43	41	37
2-39e/Oth	Unassigned/Other	NA	NA	3

2-40/Terror Including both foreign and domestic sources of terrorism, and considering both the *likelihood* of terrorism and its potential *consequences*, how would you rate *today's* threat of all kinds of terrorism in the US on a scale where zero means *no threat*, and ten means *extreme threat?*

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	0	6	14	14	7	9	14	17	13	4	2	5.1
Leg 97	0	2	8	10	8	9	19	22	12	6	3	5.8
Pub 97	1	2	4	8	7	17	12	15	13	5	16	6.3

2-41/Ter+10 Turning to the future, and using the same scale, how would you rate the threat of all kinds of terrorism in the US during the *next ten years?*

%	0 (No Threat)	1	2	3	4	5	6	7	8	9	10 (Extreme Threat)	MEAN
Sci 97	0	3	9	13	8	9	11	16	17	9	5	5.8
Leg 97	0	1	5	7	8	9	12	19	19	13	6	6.5
Pub 97	1	1	3	6	5	14	10	16	17	7	20	6.9

Now we are going to focus on nuclear weapons related research and policy. Our first few questions allow you to self-rate your level of expertise about national security issues and nuclear weapons technology. We then ask your opinion about certain policy options. We want to stress that *we want your opinions, regardless of the level of expertise you have in these matters.*

S2-42/Secknow L2-48/Secknow On a scale where one means you have *little knowledge* about national security issues, and seven means you have *extensive knowledge*, how would you rate your personal level of understanding of national security issues?

	Little Knowledge					Extensive Knowledge		
%	1	2	3	4	5	6	7	MEAN
Sci 97	5	17	19	22	24	11	2	3.8
Leg 97	4	11	15	26	31	11	2	4.1
Pub 97	10	13	18	20	23	10	6	3.9
UCS 93	3	7	14	21	33	18	4	4.4
Labs 93	3	8	13	20	33	19	4	-4.4

('93: KNOWSEC-89)

S2-43/Sciknow On a scale where one means you have *little scientific knowledge* about nuclear weapons technologies, and seven means you have *extensive scientific knowledge*, how would you rate your personal level of scientific understanding of nuclear weapons technologies?

	Little Knowledge					Extensive Knowledge		
%	1	2	3	4	5	6	7	MEAN
Sci 97	6	18	15	17	24	16	4	4.0
UCS*93	5	10	11	17	31	23	4	4.5
Labs*93	2	6	8	12	28	31	13	5.0

('93: KNOWNUC-89) *Wording in 1993: On a scale from one to seven, where one means you have *little scientific knowledge* about nuclear technology, and seven means you have *extensive scientific knowledge* of nuclear technology, how would you rate your personal level of scientific understanding of nuclear technology?

S2-44/LabKnow On a scale where zero means you are *not at all knowledgeable* about the functions of Department of Energy national laboratories involved with developing and managing nuclear weapons technologies, and ten means you are *extremely knowledgeable,* how would you rate your knowledge about the functions of these national laboratories?

	Not At All Knowledgeable									Extremely Knowledgeable		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	6	10	13	13	8	11	11	11	11	3	3	4.5

S2-45/LabWork Have you ever interacted professionally with one or more members of the technical staffs of any Department of Energy national laboratories?

%	No	Yes
Sci 97	41	59

S2-46/LabID If yes, please check each of the following labs with which you have interacted professionally. Please check all that apply.

National Facilities	%
Argonne National Laboratory	27
Brookhaven National Laboratory	20
Lawrence Berkeley National Laboratory	16
Lawrence Livermore National Laboratory	22
National Renewable Energy Laboratory	5
Idaho National Engineering and Environmental Laboratory	10
Los Alamos National Laboratory	29
Oak Ridge National Laboratory	31
Pacific Northwest National Laboratory	10
Sandia National Laboratories	21
Other Department of Energy facilities	14

Under current national policy, the US does not produce new nuclear weapons. However, what constitutes a new nuclear weapon is not clearly specified. Using a scale where one means *definitely prohibit,* and seven means *definitely allow,* how do you think each of the following potential options should be treated?

S2-47/Modern Modernizing existing nuclear weapons electronics to assure continued reliability?

		Definitely Prohibit						Definitely Allow	
	%	1	2	3	4	5	6	7	MEAN
Sci	97	1	4	3	7	18	31	37	5.8

S2-48/Safety Upgrading existing nuclear weapons safety features to reduce the likelihood of an accident?

		Definitely Prohibit						Definitely Allow	
	%	1	2	3	4	5	6	7	MEAN
Sci	97	1	1	1	3	13	30	50	6.2

S2-49/Accur Upgrading nuclear weapons features to increase delivery accuracy?

		Definitely Prohibit						Definitely Allow	
	%	1	2	3	4	5	6	7	MEAN
Sci	97	6	8	8	14	19	20	25	4.9

S2-50/NewTgt Modifying existing nuclear weapons to be effective against new types of targets that weapons in the current stockpile cannot address?

	Definitely Prohibit					Definitely Allow	
%	1	2	3	4	5	6	7	MEAN
Sci 97	9	12	9	15	18	18	19	4.5

S2-51/Yield Redesigning an existing weapon to provide a substantially different nuclear explosive yield?

	Definitely Prohibit					Definitely Allow	
%	1	2	3	4	5	6	7	MEAN
Sci 97	17	20	13	17	12	10	12	3.6

Using a scale where one means you *strongly disagree,* and seven means you *strongly agree,* please respond to the following statements regarding US and Russian scientific cooperation.

S2-52/Rusmat L2-42/Rusmat US scientists should work with scientists in Russia to help insure that Russian nuclear materials are properly protected.

	Strongly Disagree					Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	0	1	1	4	12	34	48	6.2
Leg 97	1	2	2	9	23	34	29	5.7
Pub 97	5	2	5	6	15	19	48	5.8
Pub 95	6	2	4	5	15	14	52	5.8

('95: D3/Rusmat)

S2-53/Secwpns L2-43/Secwpns Even if the money is not repaid, the US should help fund improvements to the current security of Russian nuclear weapons and materials whose theft might pose a threat to the US.

	Strongly Disagree					Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	1	2	2	6	13	31	45	6.0
Leg 97	3	4	6	13	27	27	20	5.2
Pub 97	12	7	9	10	19	17	27	4.7

S2-54/Nonwpn L2-44/Nonwpn US scientists should work with scientists in Russia to help them move from nuclear weapons research into other areas of research.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	1	2	3	9	18	29	38	5.8
Leg 97	2	3	5	14	24	29	23	5.3
Pub 97	8	6	6	9	18	18	35	5.2
Pub 95	6	4	4	8	15	15	48	5.6

('95: D5/Nonwpn)

S2-55/Payconv L2-45/Payconv The US should help pay to convert Russian nuclear weapons production facilities into those that produce other kinds of products.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	4	9	10	17	17	20	22	4.8
Leg 97	9	11	17	22	21	12	8	4.0
Pub 97	18	12	11	15	18	9	18	4.0
Pub* 95	25	11	13	12	15	5	19	3.7

('95: D6/Payconv) *Wording in 1995: The US government should help pay to convert Russian industries from producing nuclear weapons to producing other kinds of products.

S2-56/Store L2-46/Store The US should help the Russians safely dispose of nuclear materials from dismantled Russian warheads.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	1	1	3	6	14	30	46	6.0
Leg 97	3	4	5	12	23	29	23	5.3
Pub 97	9	4	6	10	17	18	36	5.2
Pub 95	10	4	8	8	18	13	38	5.1

('95: D9/Store)

S2-57/Wepay L2-47/Wepay The US should fund safe disposal of dismantled Russian nuclear warheads, even if the money is not repaid.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Sci 97	2	3	5	10	17	28	36	5.6
Leg 97	8	8	10	15	19	21	19	4.6
Pub 97	15	7	11	13	19	12	24	4.4
Pub 95	23	8	12	12	18	8	19	3.9

('95: D10/Wepay)

L2-49/Disres Does your legislative district have facilities such as research universities or laboratories whose primary function is research?

%	No	Yes
Legislators 97	62	38

L2-50/Sector If yes, which of the following major sectors of science are represented by those research facilities? Please mark all that apply.

% of all Respondents	Academe	Government	Business/Industry
Legislators 97	28	18	28

L2-51/DomIR On a scale where one means *domestic* issues should receive greater emphasis, and seven means *international* issues should receive greater emphasis, how do you think the allocation of federal resources should be distributed among domestic and international needs?

	Greater Domestic Emphasis					Greater International Emphasis	
%	1	2	3	4	5	6	7	MEAN
Leg 97	11	20	28	22	14	4	1	3.2

L2-52/FedImp On a scale where zero means *not at all important,* and ten means *extremely important,* how important to your state's economy are federal agencies located in your state?

	Not At All Important									Extremely Important		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Leg 97	1	2	6	9	10	13	12	17	15	8	7	6.0

On a scale where zero means *no input,* and ten means *substantial input,* how much input do you have in determining the following kinds of policies for your state?

L2-53/Fed$ Allocations of federal research dollars?

	No Input									Substantial Input		
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Leg 97	22	21	14	10	8	8	7	4	3	1	1	2.7

L2-54/Bases Opening or closing military facilities?

%	0 (No Input)	1	2	3	4	5	6	7	8	9	10 (Substantial Input)	MEAN
Leg 97	35	22	17	9	3	4	3	2	2	1	1	1.9

L2-55/Civfac Opening or closing federal civilian facilities?

%	0 (No Input)	1	2	3	4	5	6	7	8	9	10 (Substantial Input)	MEAN
Leg 97	28	24	17	12	4	5	5	2	1	1	1	2.0

L2-56/Mgrsk Managing nuclear risks?

%	0 (No Input)	1	2	3	4	5	6	7	8	9	10 (Substantial Input)	MEAN
Leg 97	45	18	14	8	3	5	4	1	1	0	1	1.6

L2-57/StRole Using a scale where one means *greatly decrease,* and seven means *greatly increase,* how should your state's role in determining these kinds of policies change?

%	1 (Greatly Decrease)	2	3	4	5	6	7 (Greatly Increase)	MEAN
Leg 97	0	1	3	33	38	17	7	4.9

L2-58/StSay States have too little say in determining US national security policies.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Leg 97	6	14	12	19	23	16	10	4.3

L2-59/FedResp Federal agencies operating in my state are cooperative and responsive to my concerns as a state legislator.

%	1 (Strongly Disagree)	2	3	4	5	6	7 (Strongly Agree)	MEAN
Leg 97	6	13	15	25	23	14	3	4.0

Section 3: Personal Profile

Now we need to ask a few profile questions concerning such things as education, income, and family. *Your name will not be associated with any of the information.*

S3-1/Reside L3-11/Reside Including yourself, how many people currently live at your residence?

		Means
Scientists	97	2.3
Legislators	97	2.9
Pubic	97	2.7
Public	95	2.8
Public	93	2.8

('95: B62/Reside) ('93: FAMILY-163)

S3-2/Ovr18 L3-12/Ovr18 How many of those are 18 years of age or older?

		Means
Scientists	97	1.8
Legislators	97	2.0
Pubic	97	2.2
Public	95	2.2

('95: B63/Ovr18)

P3-Added/Phones How many different residential phone lines do you have in your household? By this we mean phones with different numbers, but do not include business lines or cellular phones.

		Means
Pubic	97	1.2
Public	95	1.2
Public	93	1.2

('95: B71a/Phones) ('93: PHONES-164)

S3-3/Wkdays L3-13/Wkdays How many days a week do you work outside your home?

%	0	1	2	3	4	5	6	7	MEAN
Sci 97	24	4	5	4	3	48	9	3	3.5
Leg 97	7	0	2	7	9	41	22	12	4.8
Pub 97	23	1	3	4	4	48	11	5	3.8
Pub 95	22	1	3	4	5	48	12	4	3.8

('95: B64/Wkdays)

S3-4/Age L3-14/Age How old are you?

		Means
Scientists	97	63.0
Legislators	97	52.4
Pubic	97	44.3
Public	95	42.2
Public	93	42.3
UCS	93	52.8
Labs	93	43.7

('95: B55/Age) ('93: AGE-154)

S3-5/Gend L3-15/Gend What is your gender?

%		FEMALE	MALE
Scientists	97	8	92
Legislators	97	25	75
Public	97	55	45
Public	95	54	46
Public	93	51	49
UCS	93	23	77
Labs	93	18	82

('95: B55/Age) ('93: GEND-157)

S3-6/Race L3-16/Race Which of the following best describes your race or ethnic background?

%		American Indian	Asian	Black	Hispanic	White (not Hispanic)	Other	Don't Know
Sci	97	0	5	1	1	92	1	0
Leg	97	0	1	3	2	92	2	0
Pub	97	2	1	6	4	81	5	0
Pub	95	2	2	7	4	79	6	0
Pub	93	2	2	6	4	84	2	0
UCS	93	0	1	1	1	94	1	1
Labs	93	0	4	0	3	89	2	0

('95: B61/Race) ('93: RACE-158)

S3-7/Edu L3-17/Edu What is your highest level of education?

%	Sci 97	Leg 97	Pub 97	Pub 95	Pub 93	UCS 93	Labs 93
< High school graduate	0	0	7	6	6	0	0
High school graduate	0	2	27	28	24	3	0
Some college/voca. school	0	14	32	30	32	NA	NA
College graduate	1	26	18	20	20	9	12
Some graduate work	2	14	4	4	5	10	10
Master's degree	7	22	8	8	9	20	34
J.D. or higher law degree	0	15	1	NA	NA	NA	NA
Other doctorate	88	5	1	3	3	55	38
Other degree	2	2	1	NA	1	2	1

('95: B53/Edu) ('93: EDUCA-151)

S3-8/Income L3-18/Income Please indicate which of the following income categories approximates the total estimated annual income for your *household.*

Median Ranges

Sci 97	Leg 97	Pub 97	Pub 95	Pub 93	UCS 93	Labs 93
$90,000 – 100,000	$70,000 – 80,000	$40,000 – 50,000	$30,000 – 40,000	$35,000 – 40,000	$60,000 – 75,000	$75,000 – 90,000

S3-9/Prosector Please approximate the percentage of your professional time that you currently spend working in each of the following major sectors of science.

Means

%	Sci 97	UCS 93	Labs 93
Academe	44	39	2
Government	11	16	90
Business or industry	20	30	1
Other	24	16	6

S3-10/Protime Approximately what percentage of your professional time is spent on each of the following activities?

Means

%	Sci 97	UCS 93	Labs 93
Supervision	7	10	13
Administration	12	12	18
Teaching	18	19	4
Basic Research	17	17	13
Applied research and development	14	13	32
Application and production	4	13	32
Policy research and development	3	3	4
Other	25	24	16

L3-1/Sr How many years have you served as a state legislator? (combine service in both chambers if appropriate)

	Mean
Legislators 97	7.5

L3-2/Exper How many years of experience in public service as an elected or appointed official did you have before you were first elected to the state legislature?

	Mean
Legislators 97	5.8

L3-3/Comm Of how many legislative committees are you currently a member?

	Mean
Legislators 97	3.9

L3-4/Bills Approximately how many bills did you sponsor or cosponsor during the previous legislative session?

	Mean
Legislators 97	32.6

L3-5/Staff How many full or part time legislative staff members work directly for you?

	Mean
Legislators 97	2.5

L3-6/Time During the past year, approximately what percentage of your professional time was spent on state legislative matters, including responding to inquiries and requests from constituents?

	< 25%	25–50%	50–75%	75–100%
Legislators 97	6	27	38	29

L3-7/Ldr Do you currently hold one or more formal positions of leadership in your legislature?

%	No	Yes
Legislators 97	58	42

L3-8/Postns If yes, which positions? (verbatim answers)

L3-9/Ambi On a scale where one means *very little interest,* and seven means a *great deal of interest,* how much interest do you have in someday running for a seat in the US Senate or House?

	VERY LITTLE INTEREST					GREAT DEAL OF INTEREST		
%	1	2	3	4	5	6	7	MEAN
Leg 97	31	17	10	10	14	10	9	3.2

L3-10/Philos Using a scale where zero means *not at all likely,* and ten means *extremely likely,* how likely would you be to vote for a policy that you personally oppose, but a large majority of your constituents prefers?

	NOT AT ALL LIKELY									EXTREMELY LIKELY	
%	0	1	2	3	4	5	6	7	8	9	10	MEAN
Sci 97	6	7	11	11	9	15	10	11	12	6	3	4.9

S3-11/Ideol L3-19/Ideol On a scale of political ideology, individuals can be arranged from strongly liberal to strongly conservative. Using the options listed below, please check the box that best characterizes your own political views.

	STRONGLY LIBERAL					STRONGLY CONSERVATIVE		
%	1	2	3	4	5	6	7	MEAN
Sci 97	4	20	19	18	18	18	2	3.9
Leg 97	3	8	12	14	21	32	9	4.8
Pub 97	4	10	11	28	17	24	7	4.4
Pub 95	2	10	11	28	21	20	7	4.5
Pub 93	4	12	12	28	17	19	9	4.3
UCS 93	18	42	21	10	6	3	0	2.6
Labs 93	2	9	16	16	28	15	4	4.5

('95: B57/Ideol) ('93: IDEOL-148)

S3-12/Party With which political party do you most identify?

%		DEMOCRAT 1	REPUBLICAN 2	INDEPENDENT 3	OTHER 4
Sci	97	47	30	21	2
Leg	97	46	53	0	2
Pub	97	43	44	10	3
Pub	95	37	37	23	3
Pub	93	43	39	16	2
UCS	93	67	6	22	5
Labs	93	29	48	19	4

('95: B58/Party) ('93: PARTY-149)

P3-28a/Partisan Do you identify completely, somewhat, or slightly with that political party?

%		SLIGHTLY 1	SOMEWHAT 2	COMPLETELY 3	MEAN
Public	97	21	61	18	2.0
Public	95	21	58	21	2.0
Public	93	18	55	26	2.1

('95: B59/Partisan) ('93: PARTISAN-150)

S3-13/Redistr L3-20 On a scale where zero means that government should collect and redistribute *no income* among its citizens, and ten means that government should collect *all income* and redistribute it according to need, please indicate the degree to which you think government in the US should redistribute income.

%		REDISTRIBUTE NO INCOME 0	1	2	3	4	5	6	7	8	9	REDISTRIBUTE ALL INCOME 10	MEAN
Sci	97	12	13	21	21	7	11	6	6	2	1	0	3.0
Leg	97	16	17	19	18	6	12	6	4	3	0	0	2.8
Pub	97	28	13	13	12	6	12	4	3	3	1	6	2.9

S3-14/Trade L3-21/Trade Using a scale where one means *many fewer* trade restrictions, and seven means *many more* trade restrictions, how would you like to see current US policy change regarding trade imports to the US from other countries?

%		MANY FEWER RESTRICTIONS 1	2	3	4	5	6	MANY MORE RESTRICTIONS 7	MEAN
Sci	97	7	27	22	27	11	5	1	3.3
Leg	97	9	20	21	25	17	6	2	3.5
Pub	97	11	9	15	13	24	11	17	4.3

S3-15/ExEff L3-22/ExEff Today the policy process in the US discourages meaningful participation by most citizens.

	Strongly Disagree						Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	3	11	11	17	23	28	8	4.6
Leg 97	5	16	18	15	23	16	6	4.1
Pub 97	8	7	11	15	27	13	18	4.6

S3-16/Run L3-23/Run People in the US who want to serve in public office at the state level have a good chance of getting elected.

	Strongly Disagree						Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	8	27	24	19	16	5	1	3.3
Leg 97	2	12	16	20	25	19	6	4.3
Pub 97	14	13	17	18	20	9	9	3.8

S3-17/InEff L3-24/InEff Given the complexity of problems today, a person like me often cannot understand enough to make informed policy choices.

	Strongly Disagree						Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	21	37	14	9	12	6	2	2.8
Leg 97	31	35	16	8	8	2	0	2.3
Pub 97	16	11	13	13	20	12	15	4.1

S3-18/Vote L3-25/Vote My vote is not likely to make a difference.

	Strongly Disagree						Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	25	29	14	13	9	7	4	2.9
Leg 97	55	31	5	1	4	2	1	1.8
Pub 97	36	14	9	9	12	7	14	3.2

S3-19/Fair L3-26/Fair Our society needs to make the distribution of goods more equal.

	Strongly Disagree						Strongly Agree	
%	1	2	3	4	5	6	7	MEAN
Sci 97	12	23	14	18	18	9	5	3.5
Leg 97	26	26	13	12	12	7	3	2.9
Pub 97	16	13	12	13	16	10	21	4.1

S3-20/Share L3-27/Share Society works best if power is shared equally among all citizens.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	Mean
Sci 97	7	17	17	16	16	18	10	4.1
Leg 97	9	15	16	16	17	18	8	4.1
Pub 97	11	11	9	12	16	12	27	4.6

S3-21/Soc L3-28/Soc It is not enough to provide roughly equal *opportunities*; government must insure that *outcomes* are roughly equal.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	Mean
Sci 97	38	33	10	7	7	3	2	2.3
Leg 97	42	25	12	7	8	3	3	2.4
Pub 97	22	15	9	13	16	9	16	3.8

S3-22/Realism L3-29/Realism In today's world, every country has to take care of itself.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	Mean
Sci 97	8	22	21	14	19	12	4	3.6
Leg 97	6	17	24	17	17	12	6	3.8
Pub 97	9	12	15	13	17	13	22	4.4

S3-23/Allies L3-30/Allies The United States needs allies, because we cannot afford to go it alone.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	Mean
Sci 97	1	2	3	6	20	39	28	5.7
Leg 97	1	3	5	9	22	38	22	5.5
Pub 97	6	5	6	9	20	21	33	5.3

S3-24/WldGov L3-31/WldGov Countries are becoming so interdependent that we will eventually need a world government.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	Mean
Sci 97	14	18	10	14	21	14	8	3.9
Leg 97	38	24	10	12	9	5	2	2.5
Pub 97	26	13	11	10	16	9	14	3.6

S3-25/Peace L3-32/Peace The world would have been more peaceful if nuclear weapons had never been invented.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	MEAN
Sci 97	27	33	14	13	4	4	5	2.7
Leg 97	26	27	16	14	6	5	6	2.9
Pub 97	21	14	10	8	9	8	30	4.1

S3-26/Moral L3-33/Moral There are absolutely no circumstances in which I could justify launching a nuclear weapon against an enemy of the US.

%	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree	MEAN
Sci 97	27	27	13	9	6	11	7	3.0
Leg 97	33	23	13	9	5	10	7	2.9
Pub 97	21	11	10	10	11	11	27	4.2

S3-27/Nature L3-34/Nature On a scale where one means that nature is *fragile and easily damaged*, and seven means nature is *robust and not easily damaged,* how do you view nature?

%	1 Nature Fragile & Easily Damaged	2	3	4	5	6	7 Nature Robust & Not Easily Damaged	MEAN
Sci 97	13	26	17	16	16	9	2	3.3
Leg 97	8	18	17	16	21	16	4	3.9
Pub 97	29	18	13	11	13	8	10	3.2

S3-28/Env L3-35/Env On a scale where zero means that the world's environment is *not at all threatened,* and ten means that the world is on the brink of *environmental disaster,* how do you assess the current state of the world's environment?

%	0 Not At All Threatened	1	2	3	4	5	6	7	8	9	10 Environmental Disaster	MEAN
Sci 97	1	2	6	8	8	11	15	24	16	6	3	6.0
Leg 97	2	6	8	11	11	17	15	16	10	3	1	5.0
Pub 97	1	3	4	8	10	17	14	19	11	4	9	5.9

P3-Added/Reluc Thinking back to when I first contacted you, would you say that you were very reluctant, somewhat reluctant, slightly reluctant, or not at all reluctant to participate in our research?

	%	NOT AT ALL RELUCTANT 0	SLIGHTLY RELUCTANT 1	SOMEWHAT RELUCTANT 2	VERY RELUCTANT 3
Public	97	35	34	23	9
Public	95	38	30	23	9

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